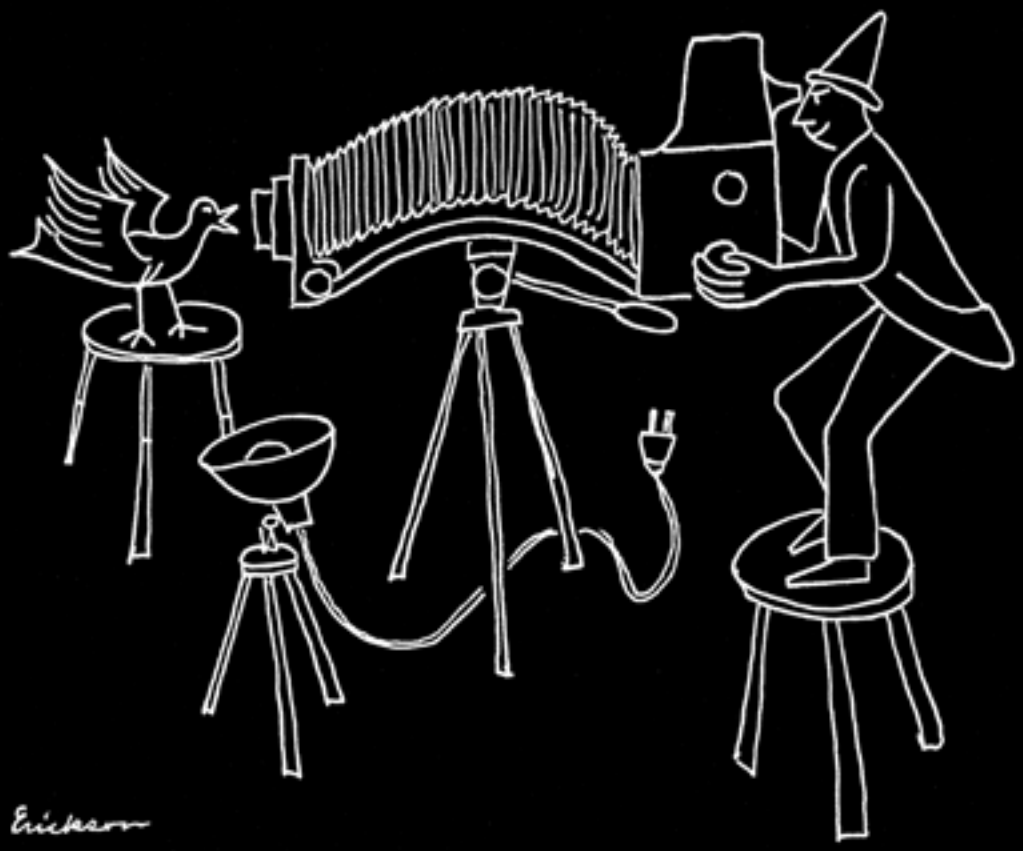
# Workbook for Black & White PHOTOGRAPHY



Kim Mosley

# Workbook for Black & White Photography

**2005 Edition**

**KEYED TO:** *Black & White Photography: A Basic Manual*
Henry Horenstein
Third Edition: Little, Brown, and Company

It has always been my belief that the true artist, like the true scientist, is a researcher using materials and techniques to dig into the truth and meaning of the world in which he himself lives, and what he creates, or better perhaps, brings back, are the objective results of his explorations. The measure of his talent—of his genius, if you will—is the richness he finds on such a life's voyage of discovery and the effectiveness with which he is able to embody it through his chosen medium. (Paul Strand, 1963)

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Additional copies of this workbook are available by writing to Kim Mosley at the above address.
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# Forward to 2005 Edition

This sixteenth printing celebrates the 27th year this workbook has been in use. It proves the need for supplemental materials to enhance learning. It is used in classrooms, by individual self-learners, and even in a correspondence course offered by the University of Missouri. It has a companion book: The *Workbook for Color Photography* (Kim Mosley and Doug Gaubatz) that accompanies Henry Horenstein's excellent book *Color Photography: a Working Manual*.

The function of this workbook is, first, to provide an active learning experience of basic black and white photography, and second, to provide an approach toward critically reading any technical manual.

As a student, it is important that you answer the questions before they are dealt with in class. This will provide you with both a challenge and an opportunity to know, as Socrates put it, what you don't know.

And as an instructor, I suggest that you assign the various chapters in the workbook before the material will be covered in class. Sometimes you will find that the workbook will both initiate and organize discussions about the information.

This workbook would not be what it is without the influence of Robert Erickson, who introduced me to photography in 1959 at the University of Chicago High School, and who contributed the drawing for the cover. As well, I thank St. Louis Community College, who provided funds and encouragement for the production of the first edition, and to a number of photographer-educators including Hans Levi, Susan Hacker, Mark Woehrle, Paul Kohl (Maryland Institute College of Art), Celia Jordan (Chicago, Illinois) and Ken White (Rochester Institute of Technology) who have used the workbook and have given me useful feedback toward its use and improvement. Thanks also goes to Hans Levi for his appendix on the threshold-of-black contact sheet and to John Nagel for his appendix, "Historical Photographic Processes."

Chris Licata was wonderful to create the design for this edition. Others gave invaluable help, including Florence Bommarito, Nicole Pflum, Linda Mosley, and Michael Martin.

I am interested in all uses and suggestions for improvement of this workbook. As further printings come out, your suggestions will be incorporated, making the workbook as useful as possible.

# CONTENTS

Note: The first number on the left indicates the page on which you can find the answer.

ii-1 What visual devices does Sally Mann use to lead the viewer's eye to the young girl? _____

_____

_____

## BEGINNINGS 1

2-1 Describe a juxtaposition you could make to bring humor into a photograph. _____

_____

3-1 Can great pictures be made with a basic camera? _____

4-1 How often should you replace your battery?_____

_____

4-2 True / False You should switch off a camera when not using it.

4-3 Indicate with an X what film to use in the chart below.

| Films | Indoors | Flash | Outdoors |
|---|---|---|---|
| 200 ISO | | | |
| 400 ISO | | | |

5-1 What is the consequence if you pull out more film than you need? _____

_____

6-1 How much should you advance the film? _____

_____

6-2 True / False Advance the film in a manually loaded camera until the film counter reads "0."

6-3 True / False A wide lens aperture, such as f/2, lets in a lot of light.

7-1 True / False A shutter speed of 1/500 lets in more light than 1/60.

7-2 What can a light meter tell you? _____

_____

7-3 What two things determine how much light hits the film in the camera?

1) _____

2) _____

8-1 What three things should you do before you take a picture? 1) _____

2) _____ 3) _____

8-2 A camera with a/an _____ rewind feature allows you to safely open the back without first without first manually cranking the film back into its cassette.

9-1 True / False Exposed film is not called a negative until it is developed.

9-2 Describe a particular effect you would like to obtain by printing a picture yourself.

_____

_____

10-1 Describe a particular situation and how you might photograph it in a way other than the obvious.

_____

_____

## 2 Camera Types

11-1 Why do you think the author says that photographers, rather than cameras, make good pictures?

_____

_____

11-2 List the three main types of cameras and describe the unique qualities of each:

1) _____

2) _____

3) _____

11-3 True / False With an SLR camera, the image is viewed during exposure, while the mirror is flipped up.

12-1 How does the camera make the image look right side up in a SLR camera? _____

_____

14-1 With a rangefinder camera, how do you know when the lens is focused on your subject?

_____

14-2 List three advantages of a rangefinder camera:

1) _____

2) _____

3) _____

15-1 What type of camera needs parallax correction?_____

16-1 Describe three ways that a view camera allows more control over the image:

1) _____

2) _____

3) _____

17-1 Describe a situation where you'd like to use a point-and-shoot camera.

_____

_____

18-1 Describe a series of photos that would be more interesting if they were shot with a Holga camera.

_____

_____

_____

19-1 Describe the feeling that is evoked by Thomas Geary's photo on page 19.

_____

_____

_____

20-1 How is viewing through a TLR different from an SLR camera? _____

_____

20-2 True / False With a TLR camera, the image can be viewed during the exposure.

21-1 List four distinct advantages of using a digital camera:

1) _____

2) _____

3) _____

4) _____

21-2 What two types of adjustments or manipulations might you need to make to images from a digital camera?

1) _____

2) _____

# 3 Black-and-White Film

22-1 Describe a photograph you would like to make that would be enhanced by coarse grain.

_____

_____

23-1 The base of black-and-white films is _____

23-2 The emulsion of black-and-white films is _____

23-3 The antihalation layer promotes _____

23-4 Define "film speed":_____

_____

23-5 How much faster is ISO 1600 than ISO 200 film? _____

24-1 Why do slow- and medium-speed films produce fine-grain images? _____

_____

24-2 What ISO film would Tom Sawyer have used to photograph Becky in the candlelit cave? _____

25-1 True / False ISO 400 (fast) film has coarser grain than ISO 50 (slow) film.

25-2 Describe the difference between the original subject and the negative image produced on the film in terms of the dark and light areas.

_____

_____

25-3 Describe an image that would be enhanced with a coarse-grain film.

_____

_____

25-4 Describe an image that would be enhanced with a fine-grain film.

_____

_____

26-1 True / False Faster films produce more tones.

26-2 What is contrast? _____

_____

Describe the size of the film for the following format cameras:

26-3 Small/35 mm format cameras use _____

28-1 Medium format cameras use _____

29-1 Large format cameras use _____

28-2 What films are especially sensitive to airport x-rays? _____

30-1 To make a bolder or more effective picture, you may have a situation in which you break a photographic convention. Describe the situation and the convention.

_____

_____

31-1 With transparency film (a film positive), would a white car normally appear white or black? _____

31-2 Chromogenic films use _____ instead of silver for convenience.

31-3 Describe a photo you would like to make using infrared film. _____

_____

_____

32-1 Describe a situation where you would like to use a telephoto lens.

_____

_____

## The Camera Lens 4

33-1 Name three functions of the camera lens:

1) _____

2) _____

3) _____

34-1 Describe a situation where you would use an interchangeable lens; what lens would you use and why?

_____

_____

35-1 Describe what "focus" means. _____

_____

35-2 What are the advantages of an autofocus camera? _____

_____

35-3 What does the size of the lens aperture control? _____

36-1 How can an autofocus camera be focused on a subject that is off-center in the frame?

_____

_____

37-1 Describe one common situation that can cause an autofocus system to falter.

_____

_____

37-2 True / False Passive autofocus cameras use a beam of red light, while active autofocus cameras analyze the light reflected by the subject.

37-3 What kind of autofocus system is best to photograph a runner coming toward you?

_____

38-1 List the common f-stops, starting with the one that lets in the greatest amount of light and going to the one that lets in the least:

1) _____ 2) _____ 3) _____

4) _____ 5) _____ 6) _____

7) _____ 8) _____

39-1 f/16 lets in half as much light as _____ and twice as much light as_____

39-2 f/2 lets in four times as much light as _____ and twice as much light as _____

40-1 How are f-stop numbers determined? _____

_____

40-2 If a lens has a focal length of 100mm and a lens opening of 25mm, the f-stop is_____

40-3 If your lens has a focal length of 6 inches and an opening of 3 inches, the f-stop is _____

40-4 Would you use a *slow* or *fast* lens in a dimly lit room? (Circle one.) Why? _____

_____

40-5 With an SLR, why does one focus *wide open* rather than at f/16? _____

_____

41-1 True / False The f-stop can be set between f/2.8 and f/4 to get to f/3.5. Explain _____

_____

_____

41-2 What controls the image area and the angle of view? _____

44-1 Describe a photograph you would like to take with a very long telephoto lens (12°). _____

_____

_____

45-1 What is another situation where less information might be better than more information, and why?

_____

_____

46-1 What are the advantages of a zoom lens? _____

_____

47-1 What are three disadvantages of a zoom lens?

1) _____

2) _____

3) _____

48-1 What kinds of distortion occur when photographing with a wide-angle lens? _____

49-1 As the aperture gets smaller (from f/2.8 to f/22), what happens to the depth of field? _____

_____

49-2 Would there be more depth of field at 4 feet or at 84 inches? (Circle one.)

49-3 The shorter the focal length of the lens, the _____ the depth of field.

49-4 Which lens would give more depth of field, one with a focal length of 28mm or one with a focal length of 35mm? (Circle one.)

50-1 Which has a greater depth of field, the dancers shot at f/2 or f/22? (Circle one.)

50-1 List three things that determine the depth of field. (Also see p. 51.)

1) _____

2) _____

3) _____

51-1 Suppose your subject is standing in front of a very patterned wallpaper. What can you do to throw the wall out of focus? _____

_____

52-1 Describe a situation in which you would *guess* the focus. _____

_____

_____

52-2 Focused at 9 ft., what is your depth of field at f/16? _____

Focused at 2.5 meters, what is your depth of field at f/4? _____

53-1 List what is, for you, the biggest pro and con of a macro lens:

Pro _____

Con _____

54-1 What would be the effect in Sally Gall's *Between Worlds,* if there were a large depth of field?

_____

_____

55-1 Describe the biggest disadvantage of a mirror lens. _____

_____

_____

55-2 Where might you use an ultrafast lens? _____

_____

_____

55-3 What is, for you, the biggest shortcoming of a fisheye lens? _____

_____

56-1 Why do you suppose Siskind titled this series as he did? _____

_____

_____

What pleasures and terrors do you see? _____

_____

# THE SHUTTER 5

57-1 Define *shutter.* _____

57-2 How does the shutter affect the final image?_____

_____

57-3 To photograph in a dark interior, you usually need to use a _____ shutter speed.

57-4 On a bright sunny day, you usually need to use a _____ shutter speed.

58-1 What is the relationship between each full consecutive shutter speed? _____

58-2 True / False When the shutter speed is changed from 1/250 to 1/500, more light is admitted to the film.

59-1 Describe a situation of your own choosing that might be enhanced with a shutter speed of 1/4.

_____

_____

59-2 Would you need either very slow film and/or very low light?_____

60-1 True / False With a mechanical shutter, you can set the speed at 1/45 by setting it halfway between 1/30 and 1/60.

60-2 To make an exposure on the *B* setting, how many times do you press the shutter button?_____

60-3 To make an exposure on the *T* setting, how many times do you press the shutter button?_____

60-4 Describe a situation where you would want to stop action._____

_____

_____

What shutter speed would you use in that situation? _____

61-1 Describe a situation where you would use the *B* setting rather than *T*._____

_____

_____

62-1 Describe a situation where you would not want to stop action. _____

_____

_____

What shutter speed would you use in that situation?_____

63-1 Describe a situation where panning is effective. _____

_____

What shutter speed would you use in that situation?_____

64-1 What would happen with a photo such as *Saigon on Wheels* if a faster shutter speed were used?

_____

65-1 What is the slowest shutter speed you should generally use without a tripod?_____

66-1 List three techniques to steady a camera:

1) _____

2) _____

3) _____

67-1 What are two common shutter types? 1) _____ 2) _____

67-2 What kind of shutter does your camera have?

Type of Camera: _____ Shutter:_____

67-3 Name two advantages of the focal plane shutter.

1) _____ 2) _____

67-4 When you use a flash, what is the advantage of a leaf shutter?_____

_____

68-1 Why do you suppose that simple pictures are often the hardest to make? _____

_____

# 6 Film Exposure

69-1 To make a good negative, carefully control the _____ of the film.

69-2 List the four factors of exposure:

1) _____

2) _____

3) _____

4) _____

*Note: For the questions below, the lightest or "thinnest" negative had the least exposure and the darkest or"densest" had the most exposure.*

70-1 How would a coal miner's sooty face appear on a good negative? (Circle one below.)

a) thin with no detail b) thin with detail c) fairly dense.

70-2 How would it appear on a negative with too much exposure? _____

70-3 How would it appear on a negative with too little exposure? _____

71-1 Without changing the f-stop or film, should a faster shutter speed be used at noon or dusk?_____

71-2 Which aperture lets in more light, f/8 or f/11?_____

71-3 Which aperture lets in more light, f/8 or f/2.8? _____

**At 32 ISO the exposure of a haystack is 1/500 at f/2.8**

71-4 What would be the exposure at 64 ISO? _____

71-5 What would be the exposure at 125 ISO? _____

71-6 What would be the exposure at 16 ISO? _____

*Note: Each time your ISO is doubled, or halved, your exposure will change by one stop.*

72-1 Each shutter speed and each f-stop (except some 1/2 or 1/4 stops like f/1.8) lets in _____

or _____ as much light as the adjacent stops.

Complete the equivalent exposures:

| | | | | |
|---|---|---|---|---|
| 72-2 | f/11 | 1/60 | f/8 | |
| 72-3 | f/8 | 1/60 | | 1/125 |
| 72-4 | f/2.8 | 1/30 | | 1/8 |
| 72-5 | f/16 | 1 sec. | f/5.6 | |
| 72-6 | f/4 | 1/125 | | 1/4 |
| 72-7 | f/5.6 | 4 sec. | f/11 | |
| 72-8 | f/2 | 1/500 | | 1/30 |

72-9 What is the difference in stops between f/11 at 1/60 and f/8 at 1/30?_____

73-1 What is the difference in stops between f/2 at 1/1000 and f/16 at 1/4?_____

73-2 What ISO film would Tom Sawyer have used to photograph Becky in the Hannibal cave? _____

73-3 True / False An ISO 400 film has larger and coarser grain than an ISO 50 film.

74-1 What information must you give your meter before you take a light reading?_____

_____

74-2 True / False Always use the precise exposure indicated by the camera.

74-3 Link the following exposures to a desired effect.

f/8 at 1/60 blurry result

f/5.6 at 1/125 greater depth of field

f/11 at 1/30 freeze a subject in motion

75-1 Let's say you were preparing to take the picture *A Young Navy Sailor* and your light meter gave an exposure reading of f/8 at 1/125. If you were satisfied with the depth of field, what exposure could you use to assure good detail in the shadows?_____

76-1 What tone does a light meter "see" when pointed at a field of snow?_____

76-2 With no adjustments to the camera, how would that scene appear on the negative? _____

_____

77-1 Generally, you can get the best exposure by reading something in the scene that is _____

_____

78-1 Where should you point a reflected-light meter?_____

_____

78-2 True / False The reflected-light reading would vary between that of a white dog and a black dog.

78-3 Where should you point an incident meter? _____

78-4 True / False The incident reading would vary between a black Cadillac and a white Porsche.

78-5 List three metering patterns and give a situation where they are useful. (Also see p. 79.)

1) _____

2) _____

3) _____

80-1 Describe a backlit subject that you might like to photograph and area on which you concentrate your meter reading for maximum effect. _____

_____

**Fill in the table below, indicating with an *X* what adjustments you must make for each camera type:**

| | Exposure Modes | ISO | F-stop | Shutter speed |
|---|---|---|---|---|
| 81-1 | Manual (M) | | | |
| 83-1 | Program (P) | | | |
| 83-2 | Aperture-priority (A or Av) | | | |
| 84-1 | Shutter-priority (S or Tv) | | | |
| 85-1 | Subject-program (Icon of head, mountain, flower, etc.) | | | |

82-1 True / False Match-needle and LED systems both depend on the camera operator to adjust the f/stops and/or shutter speeds.

85-2 When can you rely on an overall meter reading? _____

_____

87-1 Why might a black t-shirt appear grey with an overall meter reading?_____

_____

_____

87-2 To what do you adjust an exposure of f/8 at 1/60 when metering a black t-shirt? _____

88-1 Describe a situation where using a gray card would be useful and tell why. _____

_____

_____

88-2 Give an example of a situation where you might want to take an incident-light reading. _____

_____

_____

89-1 Suppose you made a reading of Sam the dog sitting by his pet turtle Albert. If your reading is f/11 at 1/125 and you want to bracket, what would your three exposures be?

1) _____ 2) _____ 3) _____

89-2 On page 89, which exposure do you think is best and why?_____

_____

_____

90-1 If the darkest shadow area on a tree trunk reads f/8 at 1/15 on your meter, what exposure would you use?

_____

90-2 Describe a situation where you might use an autoexposure (AE) compensation setting, and tell what you would use. _____

_____

_____

91-1 Describe a situation that is very different from the one above, and tell how you would change the ISO setting on your meter. _____

_____

_____

92-1 If you are unsure whether to underexpose or overexpose a negative, which should you do and why?

_____

_____

92-2 If your reading of a dark sweater were f/8 at 1/60, to what would you change your exposure?

_____

92-3 "Expose for the shadows." What else do you need to do in addition to pointing your camera toward the shadows? _____

_____

93-1 True / False If you don't have a shadow area on the negative, you can get it in the print.

94-1 What is the simplest way to handle a backlit subject? _____

_____

94-2 If your overall exposure of a backlit subject were f/8 at 1/30, what exposure should you use?

_____

95-1 What are three ways to add light to a backlit subject?

1) _____

2) _____

3) _____

95-2 What is the disadvantage of adding light to a low-light scene?_____

_____

_____

96-1 What are other reasons, besides the horse being backlit, made *Ghost Horse Spring Blizzard* difficult to expose correctly?

_____

_____

97-1 What are the three problems of using a fast film in a very low-light situation?

1) _____

2) _____

3) _____

97-2 What is another term for overdeveloping your film?_____

98-1 Why can't you always use a slow shutter speed, even when you do use a tripod? _____

_____

_____

## Camera Accessories 7

99-1 At what speeds are a tripod most useful? _____

100-1 What are four reasons to use a tripod?

1) _____

2) _____

3) _____

4) _____

100-2 True / False Always extend the center post of your tripod first, before extending its legs.

101-1 Why is a cable release a frequent companion to a tripod?_____

_____

102-1 What is the best protective filter for your lens?_____

103-1 A filter _____ its own and similar colors, and _____ the opposite colors in the print.

104-1 Describe a situation and what filter you would use to increase contrast:

Filter _____ Situation: _____

_____

Describe a situation that could be improved by using the following colored filters:

105-1 Yellow filter _____

105-2 Green filter _____

105-3 Orange filter _____

105-4 Red filter _____

105-5 Describe a situation where a polarizing filter is useful. _____

_____

_____

106-1 Describe what the picture *Sleeping Swan* would look like if Keith Carter had not used a red filter.

_____

_____

107-1 Describe a situation where a neutral-density filter would be useful. _____

_____

_____

107-2 Describe a situation where you would want to use a special effect filter. _____

_____

_____

108-1 How do you compensate for filters with a TTL (through-the-lens) meter? _____

_____

If the light meter says to expose at f/8 at 1/60, how do you figure the exposure for the following filters:

108-2 Filter factor of 2X _____

108-3 Filter factor of 3X _____

108-4 Filter factor of 1X _____

108-5 Filter factor of 12X _____

*Note: Remember that 125 ISO is 2 times as sensitive as 60 ISO.*

108-6 With an 8X filter and 125 ISO film, to what should you change the ISO on your light meter? _____

109-1 What type cameras and additional equipment are best suited for close-up work?

_____

_____

110-1 Describe what you might like to photograph with close-up equipment. _____

_____

_____

111-1 What is a danger in using compressed air to clean lenses or camera?_____

_____

112-1 How would the mood of *Charlotte* have been different if Karl Baden had used only available light?

_____

## LIGHTING 8

113-1 List some adjectives that describe each of these three important characteristics of light:

1) Strength _____

2) Quality _____

3) Direction _____

115-1 Describe an outdoor situation where you would want the light to change before taking a picture.

_____

_____

115-2 What other types of artificial light are there besides flash? _____

_____

116-1 Why is it sometimes difficult to work spontaneously in a studio? _____

_____

116-2 What is one advantage of working with hot lights?_____

_____

117-1 What message could the artist be expressing with his photograph by giving equal light to the interior of the gift store as he does to the *Grand Canyon*?

_____

_____

118-1 Another word for the *key* light is _____

118-2 The _____ direction of light shown on p. 118 is the *least* like that normally made by the sun.

119-1 Sometimes, instead of fill light, a _____ is used.

119-2 Additional lights called _____ can lighten the area behind a subject, and

_____ lights can brighten small areas.

120-1 What is one disadvantage of strobe light? _____

_____

120-2 What do you need if you don't have a *hot shoe* or built-in flash on your camera? _____

120-3 What type of flash measures the light as it is about to strike the film? _____

121-1 When Withers used a flash to photograph Tina Turner and Ikette, what two things did he achieve?

1) _____ 2)_____

122-1 Why do SLRs usually have more limited selections of shutter speeds that synchronize with the flash?

_____

122-2 What are the four factors to consider when you expose with flash?

1) _____ 2)_____

3) _____ 4)_____

123-1 The advantage of TTL autoflash is that _____

_____

123-2 True / False With non-TTL autoflash, you need to manually set your f-stop and then also adjust that setting when the flash-to-subject distance changes.

123-3 What are the three factors to consider when you use manual flash?

1) _____

2) _____

3) _____

124-1 With ISO 100 film, what f-stop do you use at 8 feet? _____

124-2 With ISO 200 film, what f-stop do you sue at 32 feet? _____

124-3 With ISO 200 film, what f-stop do you use at 5 feet if your guide number is 40? _____

124-4 With ISO 400 film, what f-stop do you use at 5 feet if your guide number is 20? _____

124-5 The advantage of bounced or diffused flash is that _____

_____

125-1 How can you bounce flash outdoors or in a room with a tall ceiling?_____

_____

126-1 What does "fill flash" fill? _____

126-2 When using flash, why does slowing your shutter speed brighten an indoor background?

_____

126-3 True / False Slowing your shutter speed may cause a synchronization problem. (Note: the answer is not in the text; try to figure it out on your own.)

127-1 Yes / No Does the lighting in the photo *Brian*, on p. 127, replicate the light from the sun?

127-2 How does the lighting in the photo *Brian* contribute to the impact or believability of the picture?

_____

_____

128-1 Describe the strength, quality, and direction of the lighting in the photo *Route 10,* on p. 128.

_____

_____

## Developing Film 9

129-1 What happens to the latent image when the film is developed? _____

_____

129-2 A darkroom should be _____ and _____

130-1 Where could you set up a darkroom in your residence? _____

130-2 The function of the light trap on the developing tank is to let the _____ in, and to keep the _____ out.

131-1 With a plastic tank, the center tube forms the _____

132-1 What temperature range do darkroom thermometers often have? _____ to _____

132-2 Why are blunt-end scissors best for film developing?_____

_____

133-1 Why should dark containers be used for storage of certain photographic solutions? _____

_____

133-2 Why is a binder box a good idea for storing negative protectors? _____

_____

134-1 If you do not have a darkroom, you can use a _____ _____ to load your film onto a processing reel.

134-2 A stock solution is _____

134-3 A working solution is_____

135-1 By framing the subject differently in *Swimmers*, on page 135, describe what other picture could be made.

_____

_____

136-1 The function of the film developer is_____

136-2 If you were to dilute 1 quart of stock solution 1:3 (1 part developer to 3 parts $H_2O$), how many quarts of working solution would you have? _____ quarts.

136-3 It would take _____ minutes to develop Tri-X film in D-76, 1:1, at 68ºF; _____ minutes at 73ºF.

137-1 True / False Time and temperatures for developing should be followed exactly according to the chart or a disaster will occur.

137-2 The function of the stop bath is _____

137-3 With the stop bath described in the text, how much stock solution should you use to make 20 oz. of working solution? _____

138-1 True / False The terms *hypo* and *fix* (or *fixer*) are interchangeable.

138-2 The function of the fix is _____

138-3 What does using a fixer check (hypo check) tell you? _____

_____

138-4 What is the function of the additive called the hardener? _____

_____

139-1 What is the function of the fixer remover? _____

139-2 What is the function of the wetting agent (such as Kodak Photo-Flo)? _____

_____

139-3 What is the ideal developing temperature? _____

139-4 What happens to film if the temperatures of the developing solutions are not similar? _____

_____

140-1 Why do some photographers mix powdered chemicals the day before processing?_____

141-1 True / False Total darkness is not really needed when you load film reels.

142-2 Why is it important to "get your ducks in a row" before the lights go off?_____

_____

143-1 What do you suppose happens to the film if you don't use the center tube (see p. 131)?_____

_____

144-1 What may happen if the reel is wet before it is loaded with film? *The answer is not in the text, but try to guess*: _____

145-1 What happens if you pinch the film too much when loading it onto the reel? _____

_____

145-2 What are the 8 steps to develop film?

1) _____ 2) _____ 3) _____ 4) _____

5) _____ 6) _____ 7) _____ 8) _____

146-1 How often during development should you agitate the tank? _____

146-2 How should you agitate the tank? _____

146-3 What might be the effect of improper agitation?_____

146-4 When should you pour the developer out? _____

146-5 When can the working solution be saved?_____

146-6 How long should film be in the stop bath? _____

146-7 How often during fixing should you agitate the tank?_____

147-1 How long should you wash the film if you use a fixer remover? _____

147-2 What must be done after you drain out the wetting agent? _____

_____

148-1 Why should you dry the film in a dust-free place? _____

149-1 Describe the function of the following, using no more than 3 words for each term:

a) Presoak_____ b) Developer _____

c) Stop Bath _____ d) Fixer _____

e) Rinse _____ f) Fixer Remover _____

g) Final Wash _____ h) Wetting Agent _____

150-1 How can you wash film well without running water?_____

_____

151-1 Describe a vintage sign, architectural oddity or roadside attraction that you might like to photograph.

_____

_____

151-2 What else would make an interesting photograph in the *cultural landscape?* _____

_____

_____

152-1 How do we control negative contrast?_____

_____

152-2 What is the effect of increasing film developing time? _____

_____

152-3 Describe a situation where you would want to increase contrast? _____

_____

_____

152-4 What is the effect of decreasing film developing time?_____

_____

152-5 How can you decrease contrast in a negative? _____

_____

152-6 What is Horenstein's definition of *pushing film*?_____

_____

153-1 What would be the effect on the shadows if you doubled the development time of the film from 8 minutes to 16 minutes? _____

_____

153-2 What would be the effect on the highlights if, in a low contrast situation, you got a reading of f/2.8 at 1/30?

_____

153-3 What ISO would you set your camera to push ISO 100 film in a low light situation? _____

154-1 Fill in the chart, as shown in the example, to reduce contrast:

| | **Exposure** | **Development** |
|---|---|---|
| To slightly reduce contrast | *Overexpose by 1 f-stop* | *Underdevelop by 20%* |
| To greatly reduce contrast | | |
| To slightly increase contrast | | |
| To greatly increase contrast | | |

154-2 What are the 3 sacrifices the photographer must accept when pushing film?

1) _____

2) _____

3) _____

155-1 In the picture on the right (p. 155), underexposing made her sweater look _____ while overdeveloping made the highlight on her face and hands look _____

156-1 Describe a situation where you would *pull* film. _____

_____

_____

156-2 True / False You should always set the ISO as indicated on the film box or cassette.

156-3 Usually, you should not need to pull the film by more than _____ stop.

157-1 What happens if you reduce your film developing time by more than 25 to 30 percent?

_____

157-2 What constant must you usually maintain for the entire roll of film? _____

158-1 What indicates that the film was developed?_____

158-2 Purple blotches on the film occur when_____

158-3 If film is completely black, then it was _____

159-1 What probably causes film to be unevenly darkened?_____

159-2 What causes film to be slightly unclear and to have a warm tint?_____

_____

159-3 What causes film to be fully developed on only one side? _____

_____

159-4 How can you tell if your film did not fully advance through the camera? _____

_____

160-1 What ordinary thing could you photograph to help the viewer see it in a different way?

_____

_____

_____

## 10 Making the Print

162-1 What is the function of the condenser? _____

_____

162-2 What are 2 benefits of a condenser enlarger?

1) _____

2) _____

163-1 Compare the results of a condenser and a diffuser enlarger. _____

_____

164-1 What are the advantages of an enlarging lens with a comparatively large opening?

_____

164-2 What will happen if you use an enlarger lens that does not have sufficient covering power for a given negative? _____

_____

165-1 What variable contrast filter gives the most contrast? _____

166-1 What is the difference between a focus magnifier and a grain focuser? _____

_____

166-2 Why do you need multiple tongs? _____

166-3 True / False You can always trust a safelight.

167-1 What details might you photograph that would take on a different meaning when separated from the whole?

_____

_____

168-1 What is the best dryer to use for archival prints? _____

168-2 True / False A paper safe is for storing valuable papers like the title for your car or house.

170-1 Printing paper consists of _____ and _____

170-2 (See also page 171) List the five things to consider when choosing a printing paper:

1) _____ 2) _____ 3) _____

4) _____ 5) _____

170-3 List three conveniences of using RC paper:

1) _____

2) _____

3) _____

171-1 Describe a situation where you would use warm tone paper. _____

_____

_____

171-2 Describe a situation where you would use cold tone paper. _____

_____

_____

171-3 Describe a situation where you would use glossy paper._____

_____

_____

171-4 Which paper grade has the most contrast? _____ The least? _____

171-5 What is the biggest advantage of variable contrast paper? _____

_____

172-1 What is unusual to you about the framing of the picture *Dance Lessons*? _____

_____

_____

172-2 Describe a public gathering that you might like to photograph. _____

_____

_____

173-1 True / False Graded paper also works with filters.

173-2 True / False Film and prints use the same developer.

174-1 True / False It will be a big problem if all your trays are not exactly the same specific temperature.

175-1 Always place the negative with the emulsion side _____ or the image will not appear in the same _____ as when you shot it.

176-1 List three ways of cleaning negatives:

1) _____

2) _____

3) _____

177-1 True / False If the grain is sharp, the image will be sharp.

178-1 Why is it best to compose with the camera (when you can)? _____

_____

178-2 Describe a situation that would be more interesting if it were a little fuzzy and grainy._____

_____

179-1 What are good f-stops to use as a starting point when you are printing? _____

180-1 True / False You can be confident that paper will not fog under the proper safelight, no matter how long the exposure.

182-1 Which side should be down when you slip the exposed paper into the tray of developer?

_____

182-2 How should you agitate the solution while the paper is in the developer? _____

183-1 What does the stop bath do to the print? _____

183-2 What does the fixer do to the print?_____

183-3 What is the shortest range of time a print needs to be in the fixer before you can view it safely in white light? _____ to _____

183-4 True / False The water in the holding bath tray should be recycled at least every 30 minutes or so if it is being filled with prints.

184-1 Describe a landscape photograph that you might like to make that comments on the impact of the effect of man on nature. _____

_____

185-1 If a test strip is too dark, it needs _____ time and/or a _____ lens aperture.

185-2 If a test strip is too light, you could try a new test with _____ second intervals, or open the lens _____ stops and longer intervals.

186-1 Define *print density*._____

_____

187-1 What are the main factors to consider when you evaluate the quality of the print you have just made?

_____

_____

188-1 If a 4" x 5" print took a 5-second exposure, approximately how long would an 8" x 10" print take? _____

189-1 Define *print contrast*._____

189-2 For average contrast from an average negative, you should use a # ____ filter or grade # ____ paper.

189-3 To increase contrast, you should use a # ____ filter or grade # ____ paper.

189-4 To reduce contrast, you should use a # _____ filter or grade # _____ paper.

189-5 To adjust print contrast, first make a print with good overall density, and then examine it for _____

190-1 Storytellers need to decide how little or how much of a story to reveal. Describe how you might significantly alter the content of the picture on page 190 by cropping.

_____

_____

191-1 If you change paper or filter, you will probably also need to change the _____

191-2 What factors determine print contrast even before printing? _____

_____

192-1 True / False Enlarging an image increases print contrast.

192-2 Describe a situation where you would want to *burn-in* a portion of the print. _____

_____

_____

193-1 If the head in the upper left on page 193 were made with a #1 filter, what filter would you use to make a print with increased contrast? #_____

195-1 When burning-in, what would happen if you didn't keep the dodging tool constantly moving?

_____

195-2 When burning-in, how much additional exposure time is recommended as a starting point? _____

197-1 With a simple printing system, what areas do you want to be correct at first? _____

197-2 What will the shadow areas indicate when the highlights look correct?_____

197-3 What should you do if the shadows seem too dark in your print?_____

197-4 When dodging, if you want to make a noticeable difference after trying an initial exposure of 20 seconds, you should try reducing the exposure to _____ seconds, _____ % of the initial time.

197-5 What is the effect of dodging too much?_____

198-1 How was the print of the horse's nose on page 198 improved with dodging?

_____

199-1 Dodging more than _____% usually makes the print look _____

199-2 Instead of attempting to dodge for a very short time, you should _____

200-1 True / False Soaking the print in water will sufficiently remove the fixer.

200-2 What will happen if you add another print to the wash but don't restart the timer? _____

201-1 Which side of the washed print should you squeegee first? _____

201-2 Why should you wash the drying screens regularly? _____

202-1 What are 3 advantages of air drying your prints?

1) _____ 2) _____

3) _____

203-1 Which side of the negative should be in contact with the paper when you make a contact sheet?

_____

*Note: See appendix Threshold of Black Contact Sheet, p. 43.*

205-1 What is a good general starting exposure time to use when you make a contact sheet?_____

205-2 For *archival* stability of a print over time, what 3 factors besides long-lasting paper increase longevity?

a) _____ b) _____ c) _____

206-207 Write in the letter for the correct *cause* for each *problem*.

| Letter | Problem | Cause |
|---|---|---|
| | Print is streaked | a) Paper is fogged |
| | Print is light & muddy on one side | b) Paper is not squarely placed in the easel |
| | One corner is darker than the rest | c) Easel is not covering all the edges of the print |
| | Image is tilted on the paper | d) Dodged too long |
| | Edges are not sharp | e) Burned-in too long |

208-1 What details were left out in *Arnold Arboretum,* on p. 208, because Akiba used high contrast?

_____

208-2 Describe a situation where you could use this high contrast technique to reduce the subject to its essential form. _____

_____

## Alternative Approaches 11

209-1 When you use infrared film, what subjects become the lightest on the print? _____

_____

209-2 For dramatic results with infrared, use the _____ filter or the _____ filter.

For less dramatic effects, use the _____ filter or the _____ filter.

210-1 Infrared film is both _____ and _____ sensitive.

210-2 Write 4 factors that influence print contrast. (Also see p. 212.)

1) _____ 2) _____

3) _____ 4) _____

211-1 What objects in Russell Hart's photograph *Untitled* would be a different tone if he had used panchromatic (conventional) film?_____

212-1 What is the name of the negative material used for high contrast?_____

213-1 True / False By mixing developer with a higher concentration, you will increase print contrast.

213-2 What are Mackie lines? _____

_____

214-1 Describe a situation that you could enhance by using solarization. _____

_____

215-1 What is a photogram? _____

217-1 Describe an opaque object and how you could like make a photogram of it.

_____

218-1 What is the disadvantage of making a photogram directly on paper?

_____

219-1 Describe how the feeling expressed in the negative print is different from that of the positive print seen on p. 219.

_____

_____

220-1 How should you position the emulsions when sandwiching negatives?_____

221-1 Describe an example of two negatives that you might choose to sandwich._____

_____

_____

222-1 Describe a print that you might hand color, and tell why that technique would enhance the photograph.

_____

_____

*Note: Answers to the following two questions are not in the text.*

Do you need to hand color the entire print? _____ Do you need to use realistic colors? _____

224-1 Describe what objects or unusual papers you might like to use with liquid emulsion. _____

_____

225-1 Why does the subject in *Glebe House*, work so well with the delicate hand coloring? _____

_____

How would the photo appear without the hand coloring?_____

_____

226-1 How do you "read" *Trace* and what does it mean to you? _____

_____

_____

227-1 How does the bilateral symmetry contribute to the meaning of the photo *Longnose Skate*?

_____

_____

228-1 What effect does Elaine O'Neil get, on p. 228, by using an antiqued sepia tone for a prehistoric-looking animal in a geometric environment? _____

_____

## Finishing the Print 11

229-1 Describe a photographic subject that you might choose to tone, and what toner you would use.

_____

_____

230-1 Describe a photographic print that you might choose to sepia tone, and tell why. _____

_____

_____

231-1 Selenium toner bath produces a _____ color and helps increase print _____

232-1 What is the best defense against dirty prints? _____

_____

234-1 Why could *spotting* be called *dotting*? _____

_____

234-2 What are 2 mistakes the beginner often makes when spotting?

1) _____

2) _____

235-1 What message is conveyed when a photographer pays great attention to the craft of producing his or her work? _____

_____

236-1 What are the 2 functions of a mount or mat?

1) _____

2) _____

237-1 List the 5 qualities of mat board:

1) _____ 2) _____

3) _____ 4) _____

5) _____

238-1 The protective cover sheet protects both the _____ and the _____

239-1 To what temperature should you preheat the dry-mount press for mounting RC prints? _____

239-2 What temperature is recommended for dry mounting fiber-based prints? _____

240-1 What is the minimum border that Horenstein recommends for a 11" x 14" print? _____

242-1 How does Horenstein recommend that you test your dry mounting job? _____

242-2 What are the advantages of an overmat? _____

_____

245-1 Why do you think it is important not to adhere any tape to the print itself when securing a print to the support board?_____

246-1 What surprised you most about Nicholas Nixon's photograph *E.A., J.A.,*?

_____

_____

# Course of Study Outline

**Photography I (16 weeks)**

1. **Catalog Description:** This course is an introduction to the medium of black and white photography, encompassing control of the craft and the meaning of the image. Students should have a camera with full aperture and shutter speed controls.

2. **Textbooks:**
   A. Henry Horenstein, *Black and White Photography,* Third Revised Edition
   B. Kim Mosley, *Workbook for Black and White Photography*

3. **General Objectives:**
   A. Exposure control—how to evaluate a scene and set the camera to properly expose the film.
   B. Development control—how to develop the film based on various considerations such as the contrast of the scene, the objectives of the photographer, etc.
   C. Printing controls—how to dodge, burn, double print, and vary contrast with filters and/or graded papers.
   D. Presentation—how to prepare prints for exhibition and portfolios.

4. **Outcomes**: The following topics are typical of what will be covered in Photography I. The list, though not inclusive or exclusive, suggests what can be expected of the student to learn.
   A. Use of the darkroom—students will learn darkroom skills, including film development, contact printing, and enlarging with controls for darkness/lightness, contrast, and dodging/ burning.
   B. Use of the camera—students will learn the operation of their cameras for a variety of situations and lighting conditions. Various methods of emphasis will be investigated, including those produced with selective focus and slow shutter speeds.
   C. Presentation—various materials and equipment will be used to spot, mount, and exhibit photographs.
   D. History of photography—the work of historical and contemporary photographers will be introduced.
   E. Assignments—6 to 7 assignments designed to give a technical and aesthetic understanding of basic photography will be given.

5. **Course Requirements. Grading is based on the following:**
   A. Attendance and Participation—class discussions and lectures are an essential part of the learning experience and cannot be duplicated by reading another student's notes or doing independent work. The class depends on the participation by each student. Regular class attendance is a requirement that must be met to obtain credit. Attendance will definitely be a consideration at the time of the final grade. Absences that exceed 4 classes (or 2 classes for a once-a-week class) will be considered excessive. Coming to class late may count as 1/2 of an absence.
   B. Assignments—are given approximately every two weeks and one-half weeks, and constitute 80% of the grade. All work can be completed during the class time with the exception of shooting and developing film. C. Examinations—may be given throughout the semester and constitute 20% of the grade. They will cover information in the text and workbook, discussions in class, and information learned through the assignments.

# Supplies for Photography I

**Textbooks:**

*Black & White Photography,* Henry Horenstein, Third Revised Edition
*Workbook for Black & White Photography,* Kim Mosley

**Equipment and Supplies:** Your instructor will probably recommend specific products.

1. Tank for developing film (plastic or metal)
2. Glass or metal thermometer
3. Film developer
4. Stop bath
5. Fixer (also called hypo).
6. Hypo eliminator (to reduce washing time of film from 30 minutes to 5 minutes).
7. Wetting agent
8. Negative holders to hold 7 strips of 5 if using 35mm..
9. Photographic paper–(RC or fiber)
10. Photographic film–35mm 20 exp. unless you have a different format camera.

11. Dry mount tissue— 8"x10"/25 sheets. Be sure to get tissue that can be used for RC paper if you are going to use RC.
12. Mounting board - 11"x14"/25 sheets. Don't get pebble board or black board without talking first to your teacher.
13. Gray card
14. 2 ea.–1 quart plastic brown bottle (if you are storing your own stock solution of film developer).

**Other Items:** (Get these from wherever you can.)
1. Plastic funnel
2. 2 ea.–1 gallon milk jugs (one used for storing $H_2O$, and one for saving old fix for recovery.)
3. 1 ea.–1 quart bottle w/screw cap. (For fix, anything clean will do.)
4. Cloth towel (Only wipe rinsed hands on it and take it home occasionally to wash it).
5. 3-ring notebook for assignments, negatives, & contact sheets.
6. A quart graduate (measuring cup), a pint graduate, and an eyecup that can measure quantities of about 1 ounce accurately. (Glass or plastic graduates from your local discount or hardware store.)

# What Can You Say About a Photo?

Part of what we learn in photo classes is a vocabulary to speak intelligently about photographs. Rather than saying, "I know what I like, but I don't know why," we can verbally communicate our responses about a photograph. By engaging in a dialogue about our photographs, we can better understand what we have created.

Here are some of the things you can say about a photograph:

1. How does it make you feel? Happy, sad, angry, mad, scared, brave, indifferent, etc.

2. Does the size, surface, shape, contrast of the print echo the content?

3. Of what does it remind you?

4. Why do you think the photographer took (made) the photograph?

5. What do you believe was the photographer's attitude about the subject

6. Do you think the photographer had the picture in his mind (previsualized) before he snapped the shutter?

7. Do you want to look at it for a long time?

8. Do you want to show it to a "best friend," as you might want to share any powerful experience?

9. What do you think the photographer means?

10. Has it showed you another way of looking at something?

# General Photo Lab Procedure

Follow these guidelines and your photography will shine!

1. You must have a towel to work in the darkroom. Use the towel to wipe your hands only after they have been rinsed in water so you do not contaminate equipment and photographic paper.

2. Keep prints in the holding bath until you are through printing. Wash RC prints in for 5 minutes. Wash single weight fiber in a dedicated print washer for 10 minutes, and 20 minutes for double weight fiber. During a wash, no new prints should go into the wash after you start timing, or the water and your prints will be contaminated, and the timing must start all over.

3. When through working in the darkroom, make sure your enlarger is turned off, your filter is out of the filter drawer, your negative and negative carrier are out of the enlarger, and the plastic bag is on the enlarger. All paper scraps and bad prints should be thrown in the garbage can. All good prints should be put on the screens and dried or taken home to dry.

4. Clean up after yourself. Clean up scraps when mounting.

5. No food, drink, or smoking is allowed in the lab or classroom. You'll be glad if you think about the smoke particles that did not land on your negatives or the soda that did not spill on your prints.

6. Always judge prints under white light.

7. If you find anything broken, please tell your teacher or the lab assistant. If it is an enlarger, identify the booth number.

8. Print dryers with metal drums are not to be used for RC. Also, they might not be clean. They are only for times when many prints must dry quickly. Ask your instructor about this if you need to use them.

9. Please save your exhausted fixer from film or print developing at home and bring it to school. Give it to the lab technician for silver recovery.

10. **This is your darkroom.** The quality of your work will be determined by the efficiency of the lab. Take pride in the lab, and make it the best possible place to print.

**Lab assistants may (politely) not sign out equipment to you if you do not follow these procedures.**

## SYLLABUS

Typical Syllabus, 16 weeks, 31–3 hour classes

| Class | Activity | Workbook Chapters | Date |
|---|---|---|---|
| 1 | Introduce class | | |
| 2 | Introduce darkroom,<br>Demo: photogram | | |
| 3 | Discuss workbook, work in darkroom | 1, 2 | |
| 4 | Demo: camera | 3 | |
| 5 | Shooting session | 4 | |
| 6 | Demo: developing film, dry mounting | | |
| 7 | **Critique: Photograms**<br>Demo: printing<br>Introduce Getting Closer | | |
| 8 | Show photos, lab | | |
| 9 | Discuss workbook, work in darkroom | 5 | |
| 10 | Show photos, lab | | |
| 11 | **Critique: Getting Closer**<br>Introduce Selective Focus | | |
| 12 | Discuss workbook, work in darkroom | 6 | |
| 13 | Show photos, lab | | |
| 14 | Discuss workbook, work in darkroom | 9 | |
| 15 | Midsemester exam,<br>**Critique: Selective Focus**<br>Introduce Motion | | |
| 16 | Discuss workbook, work in darkroom | 10 | |
| 17 | Show photos, lab | | |
| 18 | Show photos, lab | | |
| 19 | **Critique: Motion**<br>Introduce Lighting | | |
| 20 | Discuss workbook, work in darkroom | 7 | |
| 21 | Show photos, lab | | |

| Class | Activity | Workbook Chapters | Date |
|---|---|---|---|
| 22 | Discuss workbook, work in darkroom | 8 | |
| 23 | **Critique: Lighting**<br>Introduce Portrait | | |
| 24 | Discuss workbook, work in darkroom | 12 | |
| 25 | Show photos, lab | | |
| 26 | Discuss workbook, work in darkroom | 11 | |
| 27 | **Critique: Portrait**<br>Introduce Picture Page | | |
| 28 | Show photos, lab | | |
| 29 | Show photos, lab | | |
| 30 | Show photos, lab | | |
| 31 | **Critique: Picture Page** | | |
| Final | Final exam | | |

**Work will be due, dry-mounted (or matted) and spotted when specified by your instructor. At that time, you should also have at least one contact sheet for each assignment.**

# ASSIGNMENTS

## PHOTOGRAMS

**Pick one:**

1. **Traditional Photogram**—Some of the challenges to making photograms are to:

   A. create a variety of shapes and tones.
   B. create an illusion of a three-dimensional world.
   C. create and express a feeling or emotion.

   When you arrange shapes, a variety of possibilities come to mind, such as:

   A. Arrange the shapes with a constant density, such as snowflakes.
   B. Arrange the shapes with a random density, such as a junkyard.
   C. Arrange the shapes into a geometric and/or rectilinear pattern, such as the streets in a city.
   D. Arrange the shapes to create an illusion of a three-dimensional world.
   E. Arrange the shapes to create an illusion of an explosion or an implosion from or to some point in the composition. (It doesn't need to be the center.)

   As you try some of these arrangements, you'll want to create a variety of both edges and tones. The main difference between the photogram and the photograph is that in the latter a **lens** is used rather than a **group of objects** to capture an arrangement of shapes and values.

   **Minimum requirement is 2 mounted photographs.**

2. **The Photogramic Comic Strip**—make a sequence of photograms that tell a story. You may use cut out shapes, or print through paper that you have drawn on, sometimes referred to as *cliche verre*.

   **Minimum requirement is 4 mounted photographs on a board.**

3. **Combines**—if you already have some negatives, or can borrow some, lay down objects for part or all the exposure to combine the two medias. One example would project a negative of a sweater onto an actual pearl necklace.

   **Minimum requirement is 2 mounted photographs.**

## Getting Closer

**Pick one:**

1. **The Guillotine**—Using the frame as a Samurai uses a sword, cut through the haze of life and make pictures. Forget about the conventional ways of cropping. Photograph with your camera crooked, get too close, or too much of an angle. Think about the edges. And think again about those edges. As you are taking pictures, continually remind yourself to view around the frame, not just to look at the center. Forget about the ordinary picture. Show us in the ordinary the **unordinary.** Making much from nothing is the name of the game.

   Think about the edges. And think again about those edges.

2. **Maintaining a Distance**—Photograph from a particular distance (3 feet, for instance). Be close enough so your framing cuts through rather than surrounds. Get closer than you normally do, or even closer than what feels comfortable.

3. **Maintaining a Position**—Photograph from an unusual location (underneath your dining room table, for instance). Be close enough so your framing cuts through rather than surrounds. Get closer than you normally do.

4. **Maintaining a Type of Place**—Photograph from a particular type of place (doorways, for instance). Be close enough so that your framing cuts through rather than surrounds. Get closer than you normally do.

   It is important that these assignments be printed full frame (101%).

   **Minimum requirement for all of the above is 2 mounted photographs and a contact sheet.**

## Selective Focus

**Pick one:**

1. **The Pair**—There are many ways of emphasizing one's point of interest in a photograph. Lines may direct interest to a specific spot. There might be more contrast in one area than another. One object might be so different than the others that it sticks out. In this assignment, we will deal with the use of SELECTIVE FOCUS to indicate the most important part of the pictures. Because there is less depth of field (less is sharp!) at f-stops such as f/2, f/2.8, and f/4 (which can only be used in low light), most of the pictures will be taken either indoors, or outside when it is overcast or near dusk. Consciously direct the viewer's attention when he/she looks at your pictures. Do not place subjects in the middle of your photographs, but rather make the viewer work a little to "read" the images. Make pairs of similar scenes, selective focusing on different parts of the scene for different meanings. For example, in photographing an individual and their dog, one image could first focus on the individual, and then on the dog (or on the background).

   **Minimum requirement is 1 pair on a board and a contact sheet.**

2. **The Test**—Find a situation that contains a number of elements from 1 foot to infinity. Using a tripod, make a series of exposures (changing your shutter speed with each exposure) at each f-stop, focusing at something from 5–10 feet. See what happens to the "rest of the picture" as you stop down. An example: f/2 at 1/1000, f/2.8 at 1/500, f/4 at 1/250, f/5.6 at 1/125, f/8 at 1/60, f/11 at 1/30, f/16 at 1/15.

   Notes: The above example probably won't apply to your light conditions. You'll need a situation where you can expose at f/2 at 1/1000 or slower. You might want to use Pan-X (ISO 32), use a neutral density or red filter, or shoot at sunrise or sunset when the light is low. (But beware, it will change fast.)

   **Minimum requirement is 7 photos on a board and a contact sheet.**

3. **Select your Emphasis**—Find a situation that contains a number of elements positioned from foot to infinity. Shoot at f/2, changing the subject on which you focus. Change the content of the pictures by changing the point of focus.

   **Minimum requirement is 1 pair on a board and a contact sheet.**

## Motion

**Pick one:**

1. **Virtual Volume**—The purpose of this assignment is to investigate the effects of slow shutter speeds. The positive quality of the photographs should be the **blur.** We can use photography to extend our vision with long exposures. These might be as fast as 1/10,000 of a second for a bullet. But more often, they will be 1/15 of a second and slower (up to a 4-hour exposure for a photograph of the moon).

What we are interested in is:

A. The character, or personality, of the blur.
B. The shape of the blur.

You'll probably want to photograph in low light. Otherwise you'll have trouble obtaining the slow speeds. You can use a number of layers of red cellophane or a neutral density filter to shoot in bright sunlight so that your shutter speed will be slow. You'll also want to use a tripod, though you could just set the camera on a table.

**Minimum requirement is 2 pictures which may be mounted on the same board *if* they visually work together, and a contact sheet.**

2. **Blurred Motion Test**—Take a series of images of one moving subject, varying your shutter speeds from 1/1000 to speeds slow enough that the subject disappears. Use a background darker than the subject so that it is the subject, not the background, which is actually exposing the film.

   **Minimum requirement is 5 photographs mounted on a board in sequence so that the viewer gets a sense of acceleration (increasing speed), and a contact sheet.**

## LIGHTING

**Pick one:**

1. **Transformation by Light**—Photograph the same subject under different lighting conditions. Make different statements about a subject by the way that it is lit. You may either use artificial or natural light or both, but the lighting should be for a **reason,** that is, an effect, and the difference in lighting should be **dramatic.**

   **Minimum requirement is 2 pictures of the same subject and a contact sheet.**

2. **Light and Shadows**—We cannot have a photograph without light and where there is light there are shadows. On overcast days, or with diffused indoor lighting, we have soft shadows. On bright sunny days, or with a point-source indoor light, we have dark shadows with well-defined edges. The purpose of this assignment is to portray the shadows to be as significant as the light. It might help to think of this in terms of light and dark, black and white, positive and negative, or yin (the passive) and yang (the source in Chinese philosophy). For example, if you stand outside in late afternoon with your back to the sun, you see your shadow in front of you. Frame your shadow in the viewfinder. The contrast of your shadow against the ground would dominate the scene. Remember, the shadow is the dominating subject matter, not the lighted areas. Be careful with exposure. An average reading between highlight and shadow area might work best.

   **Minimum requirement is to mount 2 pictures of the same subject and a contact sheet.** (Contributed by Doug Gaubatz.)

3. **Kinds of lighting**—Produce examples of each:

   A. diffuse lighting
   B. lighting with one light source
   C. fill lighting
   D. backlighting
   E. side or edge lighting
   F. contour lighting - have the shadow of one object, which may or may not be in the picture, define the contour of another object.

   You may work on these in the classroom any time when the room is available. Print them 4" x 5" or smaller if you'd like. We suggest that your object be no darker than zone 6 (average Caucasian skin). If you want to put your heart into this and make something interesting to look at, fine. If you want to just do the job to learn about lighting, that's all right too. This will help you, in either case, to be more aware of lighting.

   **Minimum requirement is to mount 6 pictures of the same subject and a contact sheet.**

## PORTRAIT

**Pick one:**

1. **In a Relationship –** this assignment is easy to describe, but not so easy to do. Do portraits of a person in a relationship with something or someone they love. This might be an occupation, a hobby, or another person.

   Use *one* of the following methods to make a light reading: (Hint: They'll give the same reading)

   A. Read the darkest shadow in which you want detail and then close down two stops, for example, f/5.6 to f/11.
   B. Set your ISO to 1600 and read the darkest shadow in which you want detail. Make no adjustment.

Remember, if you read the darkest shadow in which you want detail and use that exposure, that value will be depicted as middle gray. To place it as black **with** detail you need to underexpose 2 stops, as either of the two methods above will accomplish. If you are shooting in a low light, low contrast situation, you could overdevelop 50% (up to 100%) to increase contrast. None of these prescriptions is foolproof. They are starting points. If you'll show your instructor your first contact sheets, you can get help to fine-tune it. This is not *pushing* film.

**Minimum requirement is 2 mounted photos and a contact sheet.**

2. **The Interactive Portrait**—Ask a stranger, a friend, or a relative if you can take a photograph of him or her. Deal with the directness of asking a person if you may make a photograph of him or her. The person should be looking at you/the camera for this portrait.

   The approach is formal in that you ask your subject if you may photograph them, but the setting can be informal—almost anywhere and using available light.

   In a portrait, the face is most important. You should watch carefully how light is falling on the face and eyes. For example, avoid direct sunlight: the shadow cast over the eyes prevents us from seeing them. You want the person to feel comfortable, but remember that he or she may need some direction about how to pose. Pay attention to everything in the viewfinder, and attempt to previsualize the finished photograph.

   Don't forget exposure and focusing. Exposure for the face is important, and focusing is almost always on the eyes. However, don't take too much time for this. Your subject will become bored. If at all possible, work out in advance these technical processes/ problems. Always take plenty of exposures. (They might blink.) When you press the shutter, you are anticipating that the picture will be right when the shutter opens. Sometimes it is, other times . . . If you have any doubts about exposure, bracket one stop in each direction. (For example, if you camera/meter tells you to use 1/60 at f/8, you could shoot also at 1/125 at f/8 and 1/60 at f/5.6) You might see on your contact sheet some portraits which may need to be reshot. Think about the necessary improvements and try again.

   **Minimum requirement is 2 mounted photos and a contact sheet.** (Contributed by Doug Gaubatz.)

3. **Pinocchio**—This assignment deals with the idea of metamorphosis, defined as change of form, shape, structure, or substance; transformation, as in myths, by magic or sorcery.

   Create three portraits of a single person:

   A. **Describe the physical description or topological map.** This is sometimes called a record shot. Include no feeling and no personality. Describe the person as an object.
   B. **Describe the personality, the gesture.** Pinocchio has come to life, but he has no soul. He is a highly developed bionic robot. Expressions, yes, but he has no inner strength, no cosmic understanding, and, alas, no spirit.
   C. **Describe the inner being of the person.** Otherwise known as the *soul* or *truth*. You might want to include an environment that contributes to the suggestion of spirit. Make sure that the picture speaks for itself, and a verbal explanation is not necessary for the viewer of the photograph *to get it*. In this photograph, Pinocchio is fully human, alive and feeling.

   **Minimum requirement is 3 mounted photos and a contact sheet.**

## Picture Page

A picture page usually contains 3 or more pictures. Odd numbers of images that cover a subject are usually the best for composition of the picture page layout.

**Examples:**

1. The graveyard:

   Picture #1–An overall picture of the graveyard with lots of gravestones in it.
   Picture #2–A close up of the carvings on a stone.
   Picture #3–A picture of flowers leaning on a gravestone.

   Picture #1 could by an 8"x10" print (the main picture). Picture #2 and #3 could be in a 4"x5" format, functioning as the support pictures to help create the mood of the picture page.

2. The bicycle:

   Picture #1–An overall picture of the bicycle. Think of an interesting angle.
   Picture #2–A profile of the seat on the bike.
   Picture #3–A close-up of the chain sprocket.
   Picture #4–A picture of the front wheel, making the wheel look oval instead of round.
   Picture #5–A close up of a reflection on the rear fender.

With each picture, think in terms of previous assignments, that is, angles, close and far, panning, etc. Print one picture as your main picture, and print the others smaller. Vary the shapes of your pictures, including verticals, horizontals and squares. The layout itself is just as important as taking the picture.

Play with the organization of the pictures as you would a puzzle. The layout should show a mood, an action, etc.

**Minimum requirement: 3 or more prints mounted in a layout. Remember, odd numbers make the best layout. You may use text if you see fit, but see your teacher if you wish to do so.**

# Print Processing Times

**RC Paper (plastic base)**

| | |
|---|---|
| Developer (Dektol) | 1–4 minutes (1 min. normal—also, keep time to less than 3 min. with papers which have the developer built-in) |
| Stop Bath | 15 seconds |
| Fixer (rapid) | 2 minutes |
| Rinse | until done printing |
| Hypo Eliminator (Hustler) | none |
| Wash | 4 minutes |

**Non-RC Paper (Fiber)**

| | |
|---|---|
| Developer (Dektol) | 1–4 minutes (2 minutes normal) |
| Stop Bath | 15 seconds |
| Fixer (Rapid) | 5 minutes |
| Rinse | until done printing |
| Hypo Eliminator (Hustler) | 3 minutes |
| Wash | 10–20 minutes |

# Historical Photographic Processes

1. **Types of Photographic Printing Processes**
   All photographic processes are based on the light sensitivity of certain compounds. Not only silver, but also iron and chromium salts react to light. The following chart of historical printing methods groups them into the light sensitive mechanism used and their date of popularity.

   **Colloid Relief**
   Carbon & Carbro (1855–Present)
   Gum Bichromate (1859, 1894–1920s, 1960s–Present)
   Woodburytype (1864–1890s)
   Dye Transfer (1935–Present)

   **Colloid & Ink**
   Bromoil (1907–1920s)

   **Ink**
   Collotype (1855–Present)
   Photolithography (1865–Present)
   Photogravure (1879–Present)
   Photosilkscreen (1915–Present)

   **Iron**
   Blueprint (1840s, 1881–Present)

   **Iron & Noble Metal**
   Platinotype (1879–1937)
   Palladiotype (Var. of platinotype)
   Kallitype (1889–?)
   Van Dyke or Brownprint (Var. of Kallitype)

**Silver**

Calotype (1839–1850)
Daguerreotype (1839–1860)
Ambrotype (1850s)
Albumen (1850–1890)
Tintype (1850s–1900)
Gelatin Silver (1873–Present)

**2. Descriptions of Photographic Processes**

**Albumen** *(al byoo' men)*—Most simply described as a variation in Talbot's process. A sheet of paper was coated with egg-albumen mixed with sodium chloride and allowed to dry. Just before use it had to be sensitized in a bath of silver nitrate. When dry it was ready for printing. Like the calotype the printing was done in sunlight, exposure carried on until the image was sufficiently visible, then it was rinsed in water, toned with gold, and finally fixed and washed. Surviving prints often have a warm reddish/purplish-brown image with yellowish whites.

**Ambrotype** *(am' bro type)*—A modification of the collodion negative making process in which the silver image of the negative is developed to a grayish-white by the addition of mercuric chloride or nitric acid to the developer. The glass plate was then painted black or backed with a dark paper. The image then showed light against the dark which was visible through the shadows. Ambrotypes were usually mounted in cases, similar to daguerreotypes. Less expensive than daguerreotypes, the ambrotype was very popular during the Civil War.

**Blueprint**—Also known as cyanotype. Two types of iron salts are coated onto a sheet of paper and allowed to dry. Exposure is by contact printing under a strong light source, developing accomplished in water. Exposed portions turn a brilliant blue; unexposed areas are washed away.

**Bromoil**—A combination of colloid and ink printing. A colloid relief is formed and dampened. Ink is then brushed onto the surface overall, adhering more to the dry areas than to the wet areas. Both manipulation and control are possible.

**Calotype** *(kal' o type)* or **Talbotype** *(tal' bo type)*—William Henry Fox Talbot's salted paper process: good quality writing paper was soaked in a weak solution of table salt (sodium chloride). Silver nitrate was then brushed on one surface (forming light-sensitive silver chloride) and allowed to dry. Exposure was made in a camera, developed in gallonitrate of silver, and fixed in hyposulphite of soda. Prints were made by contact in sunlight with similarly sensitized paper. Very long exposures were required for both negative and print.

**Carbro**—A variation of carbon printing where an enlarged print is made, sensitized with a dichromate formula, and brought into contact with a pigment tissue. The sensitizer bleaches the print which in turn hardens the gelatin proportionately. The tissue is separated from the bromide print and placed in contact with a final support paper. After a short time the transfer is complete and the image is developed in warm water as in carbon printing.

**Collotype**—Somewhat similar to photolithography, except the colloid itself covers the entire printing surface and holds the ink by virtue of a fine granular pattern formed by reticulation. Superb tonalities can he rendered but the techniques requires close temperature and humiditycontrols.

**Cyanotype** *(sy an' o type)*—Easily identified by their blue color, cyanotypes are made from iron compounds. In addition to photographs, this process was commonly used until the mid-twentieth century to reproduce architectural and industrial drawings.

**Daguerrotype** *(da ger' o type)*—Louis Jacques Mande Daguerre's invention wherein a silverplated sheet of copper is fumed with iodine vapors forming light-sensitive silver iodide. Exposure is made in a camera and the plate is developed in fumes of mercury. Particles of mercury adhere and form the image against the silvered background. Fixing was with hyposulphite of soda (now called sodium thiosulfate). Exposures often were several minutes long, so portrait subjects had to sit very still.

**Dye Transfer**—A method of producing color prints. Gelatin relief matrices are made from color separations, dyed in the complementary colors, and transferred one at a time to a final support sheet. The result is a full-colored, permanent image.

**Gelatin Silver**—A product of many evolutionary changes: printing-out paper, developing-out paper, resin coated paper, etc. Silver halides are coated onto a paper surface by way of a gelatin emulsion, exposed under an enlarger, reduced by chemical development. Fixing is a full-colored, permanent image.

**Gum Bichromate**—Gum arabic is mixed with pigment and sensitized with ammonium dichromate; then coated onto a sheet of paper. When dry, exposure is by contact, and development is in cool water. Several applications are required for full image quality.

**Kallitype**—A substitute for the platinotype using silver and ferric oxalate and having nearly as rich a

print quality.

**Palladiotype**—A variation of the platinotype using palladium in place of platinum.

**Photogravure**—A pigment tissue is exposed and transferred to the surface of a copper plate. After developing and exposing parts of the plate, etching is allowed to take place in successive baths of iron perchloride. The plate is attacked in proportion to the amount of pigment tissue remaining on its surface. An overall granularity is achieved by first laying on an aquatint prior to the image. Printing **the prepared** plate is by the intaglio process: ink is forced into the recesses of the plate and then wiped off the surface. A sheet of paper is then placed on top and pressure applied with a press for the image transfer.

**Photolithography**—A lithographic stone is coated with albumen sensitized with potassium dichromate. The stone is exposed by contact printing and developed with water. The albumen left on the stone is then inked with greasy ink, while the stone itself is dampened with water, repelling the ink coat. The image is then transferred to a sheet of paper by passing the stone and paper through a press.

**Photosilkscreen**—Also known as photoserigraphy. Traditionally, fine-mesh silk fabric is stretched and fixed over a wooden frame. (Modern materials included nylon, polyester, and metal fabrics.) Dichromated gelatin is coated on the screen and allowed to dry in the dark. Then an exposure is made by contact printing a line, or halftone, or posterized litho film positive. The image is formed as unexposed gelatin which remains unhardened, and is developed by washing out these unexposed areas with hot water. Printing is accomplished by squeegeeing special inks through the open areas of the mesh onto the final support. The process is extremly versatile and can be applied to the greatest variety of support materials.

**Tintype**—Similar to the ambrotype, except the emulsion is coated onto a piece of metal which has been painted black. Like the daguerreotype, the ambrotype and tintype images were one of a kind and could not readily be reproduced.

**Van Dyke or Brownprint**—A variation of Kallitype that omits the ferric oxalate.

**Woodburytype**—A gelatin relief is formed utilizing the properties of a dichromate sensitizer, but without pigment. The relief is placed in contact with a sheet of lead and then placed in a press where a pressure of 5 tons per square inch is applied. The gelatin is forced into the lead and the result is a shallow mold. Warm, pigmented gelatin is poured into the mold and a sheet of paper placed on top. When forced through a press the image was transferred to the paper and the excess gelatin forced out the sides. The result is difficult to distinguish from a carbon print.

# Contrast Filter Equivalents

| Paper Grade/ Filter | Color Enlarger Filtration |
|---|---|
| 0 | 80 Yellow |
| 1/2 | 55 Yellow |
| 1 | 30 Yellow |
| 1 1/2 | 15 Yellow |
| 2 | 0 |
| 2 1/2 | 25 Magenta |
| 3 | 40 Magenta |
| 3 1/2 | 65 Magenta |
| 4 | 100 Magenta |
| 4 1/2 | 150 Magenta |
| 5 | 200 Magenta |

# Making a Threshold-of-Black Contact Sheet (T.O.B.)

**1. Materials Needed**

A. Grade #2 or variable contrast enlarging paper (without filters), glossy.

B. Double weight glass or contact printing frame.

C. A roll of negatives in a clear type of negative preserver (preferable for ease of handling).

**2. Procedure**

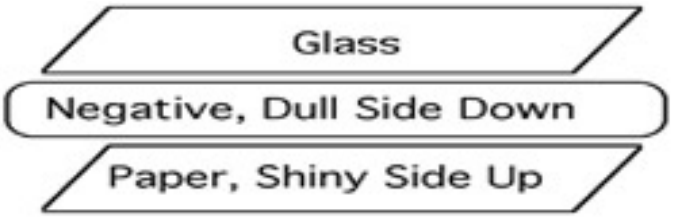
A. Make a test strip.

1. Cut a piece of photographic paper 1 1/2" x 8".

2. Put enlarger 1/2 way up, about 18" from baseboard.

3. Place lens in enlarger and put out of focus to maximum degree. Set at f/8.

4. Place your negatives in a sandwich between unexposed paper and glass. The emulsion (shiny side) of paper should face emulsion (dull side) of negatives. Keep negatives in preserver for entire process.




5. Give the paper an initial exposure of 8 seconds. Do this by setting your timer at 4 seconds and press the starter button twice.

6. Expose again at 4 seconds, covering 1/2 of a frame with cardboard. Repeat, moving board 1/2 frame further each time.

7. Develop for recommended time. *Do not cheat*. After processing in the stop bath, fix for at least 1 minute. Then rinse strip and view under white light.

8. Examine the strip carefully to determine at which step there is no longer a visible change in the clear edge of the film around the sprocket holes. The step where this first occurs is the threshold of black. (T.O.B.)

a. If you see a change in the *black* to the very end, you may not have found threshold of black. Repeat the test using f/5.6.

b. If the first swatch is really black, and there are no sprocket holes visible, you have given the strip too much light. Repeat the test using f/11.

B. Make a contact sheet.

1. Use normal procedure for making a contact sheet, except use the time that produced T.O.B.

2. If you are using a mechanical timer instead of an electronic timer, which is more accurate, do not reset your timer, but instead, press the starter button on the timer as many times as required for T.O.B. Remember the initial 2 presses (or 8 seconds).

**3. Evaluation - look at the contact sheet under bright white light**

A. *If your photographs look the way you want them* in your T.O.B. contact sheet, then you correctly exposed and developed your film.

1. If you do not change the height of the enlarger, the T.O.B. exposure will be the *best* print exposure for a perfectly exposed and developed negative.

2. If you change the height of the enlarger, or the area of projection, then you still know that your negative will print on grade #2 (or variable contrast without a filter). However, you may fine-tune to taste by decreasing or increasing contrast.

B. *If at the T.O.B. your pictures look too dark,* then you underexposed and/or underdeveloped your film.

1. If they are consistently flat (highlights look gray and the tones are not sufficiently separated), then you probably

underdeveloped your film. If they are underdeveloped, you will need to print with #3, #4, or perhaps #5 paper or variable contrast filters. The flatter they are, the higher number you will need to use.

2. *If the shadow areas are lacking in detail,* then you probably underexposed your film. Try to increase contrast. If the highlights will carry the picture, you may get fine results.

C. *If at the T.O.B. your pictures are too light,* then you overexposed and/or overdeveloped your film.

1. *If it is overexposed,* it will look uniformly light. In this case, print with more exposure, and then judge contrast.

2. *If it is overdeveloped,* the highlights will be blocked and print white. The shadow areas will have detail and may look exceptionally good. In this case, use a #l paper or variable contrast filter #l, which will hopefully give you detail in the highlights.

# How to Develop Film

Notes to start: Review the entire process before you start. Practice with a spare roll of film. As the Buddhist proverb says, *remain calm, and keep full control over all*. Here's the equipment you'll need: **thermometer, film tank, clothes pin, D-76, fixer, graduates, hypo-eliminator, Photo-Flo, bottles, and negative sleeves.**

1. **Always make sure the reel is dry.** This can be done with a hair dryer if necessary.

2. **Load film in total darkness.** To determine if a room is light-tight, be sure to sit in the room for 30 seconds until your eyes adjust. You might have to put a coat or rug at the bottom of the door.

3. **Put out all the chemicals in the order that you will need them.** That is: **developer, stop bath, fixer, (rinse), Photo-Flo.** Remember that developer, stop bath, and fixer should all be the same temperature. By storing your chemicals together in an area of your living environment that is close to 70°, your chemicals will remain very close to the same temperature.

4. Be sure to **dilute your D-76 1:1** after you make up the working solution. An **example** of 1:1 dilution would be 8 oz. of developer and 8 oz. of water. To determine how much solution your tank needs, either read the bottom or side of your tank (usually on plastic ones), or fill it with water and measure. Dilute your stop bath (if it is Kodak Indicator Stop Bath or 28% Acetic Acid) 1/2 ounce of acid to 9 1/2 ounces of $H_2O$.

5. To get the **correct developing time,** go to the last page of your workbook and read the time for **D-76 *1:1*,** not for **D-76.**

6. **Start your timer and pour developer into tank as quickly as possible,** tilting the tank and tapping it on a counter as you pour. **Agitate for the first 30 seconds, and thereafter for 10 seconds of every minute, on the minute.** If you have a plastic tank with a stick or thermometer agitator, very gently move agitator in one direction and then in the other. If you have a tank that can be turned upside down, turn tank upside down—first forward, then backward, then to the right side, and then to the left. Do a complete set of agitations once every minute.

7. When your time is up, **dump out the developer A.S.A.P.** and fill the tank with stop bath, which must be the same temperature as your developer. Agitate constantly for 15 seconds. **Dump.**

8. **Pour in hypo (also called fixer).** Agitate intermittently for five minutes if you use Kodak Fixer or Kodafix, and two minutes for Kodak Quick-Fix.

9. **Rinse for 30 seconds.** At this point you can use running water. The temperature can now vary between 60° and 80° for the rest of the processing.

10. **Hypo-eliminate** according to the instructions on its bottle, except use at least twice the recommended time. With Orbit Bath, Hustler Rapid Bath, or Kodak Hypo Clear, use two minutes.

11. **Wash film for 5 minutes.** You can make a film washer by punching holes near the bottom of a cottage cheese container so that the water level is maintained with fairly brisk running water.

12. As soon as you have rinsed the film, put it into the **Photo-Flo with continuous agitation for 30 seconds** and hang the film up in a dust-free place. It is extremely important that you hang the film in a dust free place.

13. Preferably, wait overnight before you cut your film up. Put it on an **absolutely clean surface** before you cut it up. You can tell if it is dry if the bottom (lowest) corner is dry.

# Film Developing Times

| | Developer | 66°F/19°C | 68°F/20°C | 70°F/21°C | 72°F/22°C | 75°F/24°C |
|---|---|---|---|---|---|---|
| **Kodak 100 T-MAX** | D-76 (Stock) | 7:15 | 6:30 | 6 | 5:15 | NR |
| | D-76 (1:1) | 10:30 | 9:30 | 8:30 | 7:45 | 6:30 |
| | T-MAX (1:4) | 8:30 | 7:30 | 6:45 | 6 | 5:15 |
| | HC 110 Dilution B (1:31) | 6:30 | 6 | 5:30 | 5 | NR |
| | Ilford ID-11 (Straight) | 8:45 | 8 | 7:15 | 6:30 | 5:30 |
| | Ilford ID-11 (1:1) | 13:15 | 12 | 10:45 | 9:45 | 8:15 |
| **Kodak 400 T-MAX** | D-76 (Stock) | 8:45 | 8 | 7:15 | 6:30 | 5:30 |
| | D-76 (1:1)/Ilford ID-11 (1:1) | 13:45 | 12:30 | 11:15 | 10 | 8:45 |
| | T-MAX (1:4)/Ilford ID-11 (Straight) | 7:45 | 7 | 6:30 | 5:45 | 5 |
| | HC 110 Dilution B (1:31) | 6:30 | 6 | 5:30 | 5 | NR |
| **Kodak P3200 T-MAX** | D-76 (Stock) | 15:30 | 14 | 12:30 | 11:15 | 9:45 |
| | HC 110 Dilution B (1:31) | 11:45 | 10:30 | 9:30 | 8:30 | 7:15 |
| **Kodak 125 PLUS-X** | D-76 (Stock) | 6 | 5:30 | 5 | NR | NR |
| | D-76 (1:1) | 9:30 | 8:30 | 7:45 | 7 | 6 |
| | Ilford ID-11 (Straight) | 7:45 | 7 | 6:30 | 5:45 | 5 |
| **Kodak 400 TRI-X** | D-76 (Stock) | 7:30 | 6:45 | 6:15 | 5:30 | 4:45 |
| | D-76 (1:1) | 11 | 9:45 | 8:45 | 8 | 6:45 |
| | Ilford ID-11 (Straight) | 8:30 | 7:30 | 6:45 | 6 | 5:15 |
| | Ilford ID-11 (1:1) | 11:15 | 10 | 9 | 8 | 7 |
| **Ilford Pan F Plus (50)** | D-76 (Stock)/Ilford ID-11 (Straight) | 7:15 | 6:30 | 6 | 5:15 | NR |
| **Arista Pro® 50** | D-76 (1:1) | 11:45 | 10:30 | 9:30 | 8:30 | 7:15 |
| | Ilford ID-11 (1:1) | 9:30 | 8:30 | 7:45 | 7 | 6 |
| **Ilford FP4 Plus (125)** | D-76 (Stock) | 8:45 | 8 | 7:15 | 6:30 | 5:30 |
| **Arista Pro® 125** | D-76 (1:1)/Ilford ID-11 (1:1) | 12:15 | 11 | 10 | 9 | 7:30 |
| | Ilford ID-11 (Straight) | 9:30 | 8:30 | 7:45 | 7 | 6 |
| **Iford HP5 Plus (400)** | D-76 (Stock)/Ilford ID-11 (Straight) | 8:30 | 7:30 | 6:45 | 6 | 5:15 |
| **Arista Pro® 400** | D-76 (1:1) | 12:15 | 11 | 10 | 9 | 7:30 |
| | HC 110 Dilution B (1:31) | 5:30 | 5 | NR | NR | NR |
| | Ilford ID-11 (1:1) | 14:30 | 13 | 11:45 | 10:30 | 9 |
| **Ilford Delta 100** | D-76 (Stock) | 10 | 9 | 8 | 7:15 | 6:15 |
| | D-76 (1:1) | 13:15 | 12 | 10:45 | 9:45 | 8:15 |
| | HC 110 Dilution B (1:31) | 6:30 | 6 | 5:30 | 5 | NR |
| | Ilford ID-11 (Straight) | 9:30 | 8:30 | 7:45 | 7 | 6 |
| | Ilford ID-11 (1:1) | 12:15 | 11 | 10 | 9 | 7:30 |
| **Ilford Delta 400** | D-76 (Stock)/Ilford ID-11 (Straight) | 10:30 | 9:30 | 8:30 | 7:45 | 6:30 |
| **Arista DMAX® 400** | D-76 (1:1)/Ilford ID-11 (1:1) | 15:30 | 14 | 12:30 | 11:15 | 9:45 |
| | HC 110 Dilution B (1:31) | 8:30 | 7:30 | 6:45 | 6 | 5:15 |
| **Ilford Delta 3200** | D-76 (Stock)/Ilford ID-11 (Straight) | 11:45 | 10:30 | 9:30 | 8:30 | 7:15 |
| | HC 110 Dilution B (1:31) | 16 | 14:30 | 13 | 11:45 | 10 |

NR=not recommended since unsatisfactory uniformity may result with development times less than 5 minutes.
Agitation for 10 seconds at 1 minute intervals—time in minutes/seconds.
For additional films, developers, dilutions, and time/temp chart
see the Massive Dev Chart at
http://www.digitaltruth.com/devchart.html

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