

## Problem Set 2

Due 5:30PM on Monday, October 31, 2011.

Type your answers for the following questions in a word processor; we will accept Word Documents (.doc, .docx), PDF documents (.pdf), or plaintext files (.txt, .rtf). Before the due date, place the file into your "**Pset 2**" folder in the Dropbox folder we shared with you from project 1.

1. (3 points) It is a bright, sunny day and you want to keep your shutter open for as long as possible. You reach into your equipment bag to grab a filter. Which one is the best for the job?
2. (3 points) The Sunny 16 Rule says that, on a bright and sunny day, you can set your camera's exposure settings to which of the following?
  - a) 1/100s, ISO 100, *f*/16
  - b) 1/200s, ISO 100, *f*/11
  - c) 1/6400s, ISO 400, *f*/4
  - d) All of the above
  - e) None of the above
3. (3 points) Describe the symbols for focal plane location and filter size. What is the difference between the two?
4. (3 points) How might an image appear if you manually override the X-sync speed on an SLR camera and take a photograph with flash and a very high shutter speed?
5. (3 points) You notice that you have some dust on your digital SLR's sensor. You remember from class that you can change one of the three exposure values (ISO, shutter speed, or F-number) to make the dust more visible. Which of these three should you change and how should you change it to make the dust visible?
6. (5 points) Does a lens that focuses by extending inward or outward change its focal length? Why or why not?
7. (5 points) What is exposure compensation? Explain why it would be unusual to use this feature when manipulating a camera's exposure settings in the manual mode.
8. (5 points) The Earth is three (3) times as far from the sun as the planet Mercury. Ignoring any atmospheric effects, how much more intense is light from the sun on Mercury compared to the Earth?
9. (5 points) Explain why you must change your distance from an object to change your perspective of it. Why is it not sufficient to change your zoom level of an object in your viewfinder to change your perspective?
10. (5 points) If you must use flash to take a photo of a person in a dark location, name two ways you can eliminate red eye at the time of exposure without requiring the use of software such as Adobe Photoshop. "Red eye reduction" features tend to be fairly ineffective compared to other possible methods, so be sure not to use that!

11. (5 points) How can you take a photo of a single event (such as a balloon popping) that occurs faster than your camera's fastest shutter speed? Be sure to list the necessary sequence of steps to obtain this photo.
12. (5 points) The guide number for a flash unit is given as 32 feet at ISO 100. The lens on the camera has a maximum aperture of  $f/2.8$  and the flash unit is attached directly on top of the camera. If the camera is set to ISO 100 and the shutter speed set at the X-sync speed, what should be the F-number if the subject in the photo is 8 feet away? If the subject moves to 16 feet away, what are your options to ensure a properly exposed photograph?
13. (10 points) You continue to take photos with the same flash unit with a guide number of 32 feet at ISO 100. The lens on your camera has a maximum aperture of  $f/2.8$  and a minimum aperture of  $f/16$ , and the flash unit is attached directly on top of the camera. The camera's X-sync speed is  $1/250$ s and it has minimum and maximum ISO values of 100 and 800, respectively. Assume that the flash always operates at full power, there are no light sources aside from the flash, and you are not using any devices to block or diminish the light output from the flash.

What exposure values must you set to allow you to properly expose a subject as far away as possible from the camera? As close as possible to the camera? What are the maximum and minimum distances (respectively) of a subject that can be properly exposed with this setup?

14. (10 points) Image stabilization technologies are designed to help reduce motion blur. Explain two unique situations in which a photograph that was taken with an optical image stabilization system has motion blur. Assume that the image stabilization system was turned on and working properly at the time of exposure. You may use a diagram, but it can only act as a complement to your explanation and not as a replacement for one.
15. (10 points) Explain, in a few sentences, how altering the F-number allows the depth of field to change. If the F-number increases, does depth of field increase or decrease? Include a discussion on the permissible circle of confusion; what is it and how is it related?
16. (10 points) Is nearly every object in a photograph taken with a pinhole camera in focus or out of focus? Prove your answer as correct (you may use your answer from the previous question as evidence, if applicable). If you determine that all objects are in focus, and assuming the camera was perfectly still during the exposure, what are other possible explanations for a pinhole photograph to be blurry?
17. (10 points) Assume a camera has four automatic modes: **Portrait**, **Sport**, **Daytime Landscape**, and **Nighttime Landscape**. For each mode, explain how the camera would bias each of the three exposure values (ISO, shutter speed, and F-number) to be best suited for that mode. Assume the camera is only using available light so flash units are unavailable and cannot be used.