

## Problem Set 2

Due 11:59PM on Friday, March 8, 2013.  
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Please type your answers to the following questions in a word processor; we will accept Word Documents (.doc, .docx), PDF documents (.pdf), or plaintext files (.txt, .rtf). If you prefer, you may write out the problems on a sheet of paper, scan it, and submit the scanned document as a PDF. Please place the file into your "**Problem Set 2**" folder in the submission tool prior to the due date.

1. (3 points) It is a bright, sunny day and you want to keep your shutter open for as long as possible. What is the most suitable filter to use for this purpose?
2. (3 points) The "Sunny 16" rule states that, on a bright and sunny day, you can set your camera's exposure settings to which of the following?
  - a) ISO 100, 1/100s, *f*/16
  - b) ISO 100, 1/200s, *f*/11
  - c) ISO 400, 1/6400s, *f*/4
  - d) All of the above
  - e) None of the above
3. (3 points) Describe the symbol for focal plane location and the symbol for filter size. How do the two symbols differ?
4. (3 points) How might an image appear if you were to manually override the X-sync speed on an SLR camera and take a photograph with a 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 and 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 than it is on the Earth?
9. (5 points) Explain why you must change your distance from an object to change your perspective view of it. Why is it not sufficient to change the focal length of your lens (the zoom level) to change your perspective?
10. (5 points) If you must use a flash to photograph a person in low light, what are two ways that you can eliminate red eye at the time of exposure without subsequent use of photo-editing 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 that occurs faster than your camera's fastest shutter speed (such as a balloon popping)? Be sure to list the necessary sequence of steps to achieve 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 the f-number be if the subject in the photo is 8 feet away? If the subject moves to 16 feet away, what would be the options to ensure a properly exposed photograph?
13. (10 points) You continue to take photos as in question 12 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 has an X-sync speed of  $1/250$ s and minimum and maximum ISO values of 100 and 800, respectively. Assume that the flash always operates at full power, there are no light sources other than 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 properly expose a subject that is as far away as possible from the camera? What are the exposure values for a subject that is as close as possible to the camera? What are the maximum and minimum distances 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 changes depth of field. 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 to depth of field?
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 blurred?
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 used with available light only and with no flash units involved.