

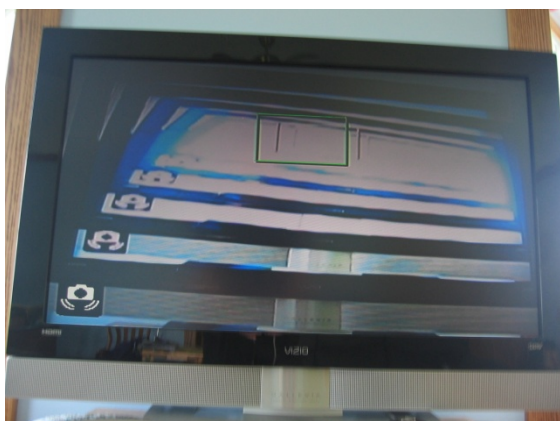
Digital Photography

Northern New York Library Network

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Course objectives.

- To provide the class with an in depth exploration of digital photography and cameras through lecture and exercises.
- To explore digital camera options and capabilities.
- To develop computer literacy.
- **To address the *class'* questions.**

Schedule

- 9:00 registration
- 9:30 morning session with break
- 12:00 lunch
- 1:00 afternoon session with break (may begin earlier if class is ready)
- 3:30 conclusion

1. Quiz
 - a. Who's carrying analog? Digital?
 - b. Why did you go digital?
 - c. What's your big question?
2. Basic pieces parts
 - a. Body
 - b. Lens
 - c. Mode selector
 - d. Shutter button
 - e. Zoom
3. Basic camera use
 - a. Use your simple or AE mode
 - b. Put your autofocus bracket on your subject
 - c. Hold your shutter button halfway to set focus and exposure
 - d. Move the camera as you need
 - e. Press the shutter!
4. Photographers – balancing needs, wants and budget
 - a. Professional
 - b. Prosumer
 - c. Consumer
5. General camera types
 - a. Cheap
 - b. Compact
 - c. Ultracompact
 - d. Enthusiast
 - e. Superzoom
 - f. Digital SLR

| July 2007 | Price range | | MP range | | Pro | Con |
|--------------|-------------|------|----------|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| Cheap | 100 | 250 | 2 | 4 | <ul style="list-style-type: none"> • Inexpensive • Entry level features | <ul style="list-style-type: none"> • Poor performance • Often old or inferior models |
| Compact | 200 | 400 | 4 | 7 | <ul style="list-style-type: none"> • Pocket (large) sized • Good pictures | <ul style="list-style-type: none"> • Few professional features |
| Ultracompact | 200 | 500 | 4 | 7 | <ul style="list-style-type: none"> • Truly pocket sized • Range of sophistication | <ul style="list-style-type: none"> • No to low zoom |
| Enthusiast | 300 | 1000 | 5 | 12 | <ul style="list-style-type: none"> • For serious user • Precision controls • Better images | <ul style="list-style-type: none"> • Cost • Size |
| Superzoom | 250 | 600 | 5 | 10 | <ul style="list-style-type: none"> • 10X or greater zoom • Generally larger than compacts • Usually more features | <ul style="list-style-type: none"> • Can be expensive • Size |
| Digital SLR | 500 | 8000 | 8 | 20 | <ul style="list-style-type: none"> • Professional features • Interchangeable lens • Best image quality • Optical preview is through lens | <ul style="list-style-type: none"> • Large • Heavy • LCD preview often not available |

6. Shopping

a. Form factor

- i. Balance size and portability
- ii. Smaller cameras generally have weaker flash and less zoom
- iii. Range
 1. SLR
 2. Compact SLR
 3. Compact
 4. Ultra compact

b. Getting the shot

- i. LCD
 1. Size matters when it comes to preview and review and reading options
 2. Pivoting
- ii. Optical
 1. Great in sunlight, often preferred for action shots or low light
 2. Often missing on inexpensive cameras

c. Sensor

- i. Photosensitive electronics either CCD (charge-coupled device or CMOS (complementary metal oxide semiconductor) consisting of a large number of sensors which record an intensity level. Sensors do vary in quality and speed.

ii. Megapixel – A

megapixel is 1 million pixels, and is a term used not only for the number of pixels in an image,

| MP | |
|-------|----------------------------------------|
| <4 | Great for kids and websites |
| 4 | 8x10 prints |
| 5 – 7 | Current “sweet spot” |
| 8 | 10x16 |
| >8 | Professional options and larger prints |

but also to express the number of sensor elements of digital cameras or the number of display elements of digital displays. For example, a camera with an array of 2048x1536 sensor elements is commonly said to have "3.1 megapixels" ($2048 \times 1536 = 3,145,728$).

iii.


d. Battery

- i. Standard AA or AAA
 1. Go high or go cheap when buying disposable for the best price per picture.
 2. Don't hold up to the flash, get lots!
- ii. Rechargeable
 1. Li-ion = Lithium ion is superior
 2. Generic rechargeable AA don't tend to hold up to the flash.
 3. Some will take AA in an emergency.

e. Lens

- i. Plastic vs. glass
- ii. Quality of optics

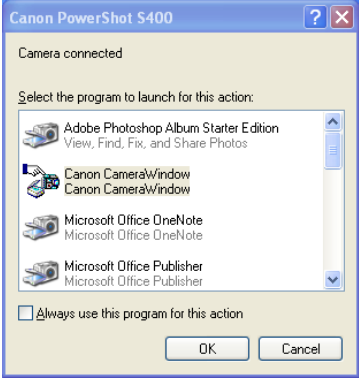
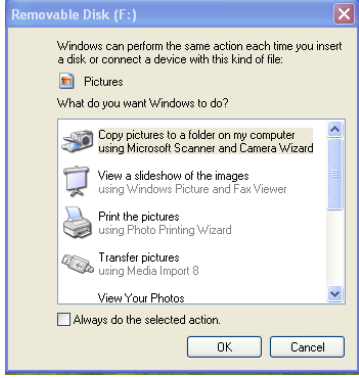
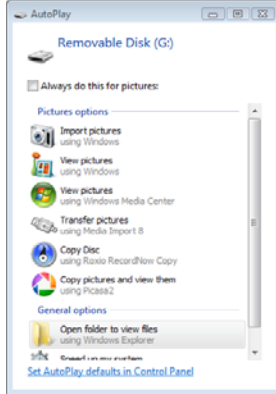

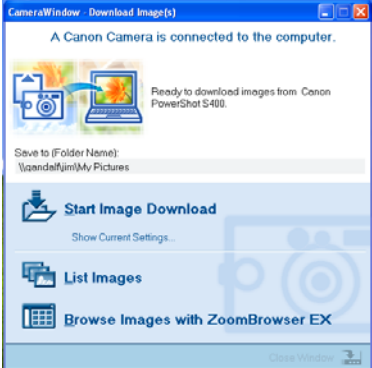

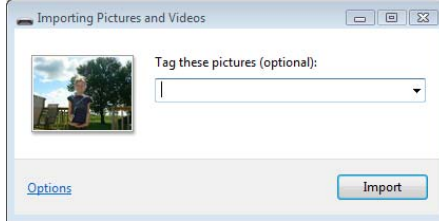
- f. Zoom
 - i. Optical – bringing a subject closer though the mechanical manipulation of the lens and sensor from wide-angle through telephoto ranges.
 - ii. Digital – electronic enlargement and cropping of actual image, leads to loss of quality and can always be done later on a computer.
- g. Memory
 - i. Types
 - 1. Internal
 - 2. External
 - a. Memory cards
 - i. SD or Secure digital
 - 1. Mini-SD
 - 2. Micro-SD
 - ii. xD-Picture card
 - iii. Compact Flash
 - iv. Memory Stick
 - 1. I
 - 2. Pro
 - 3. Duo
 - v. Smartmedia

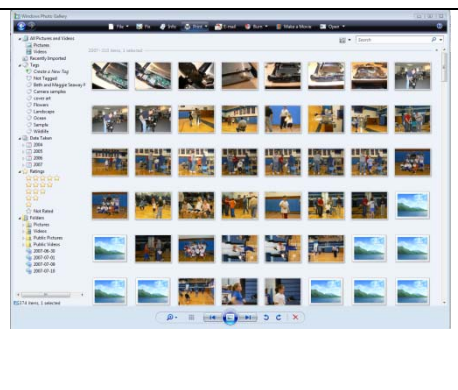
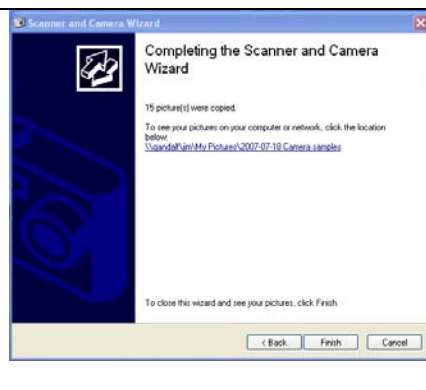
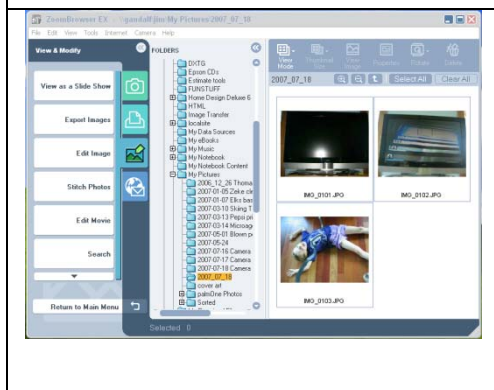
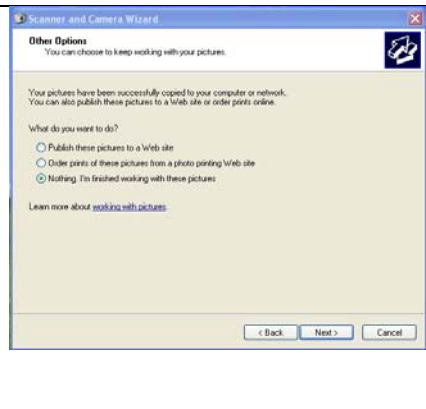
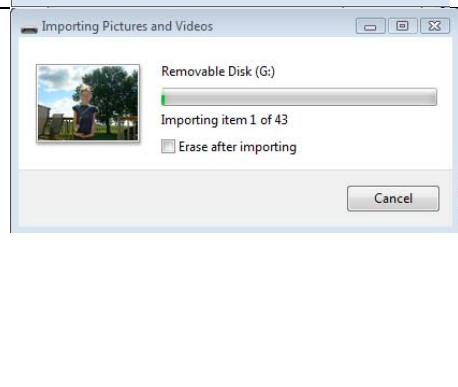
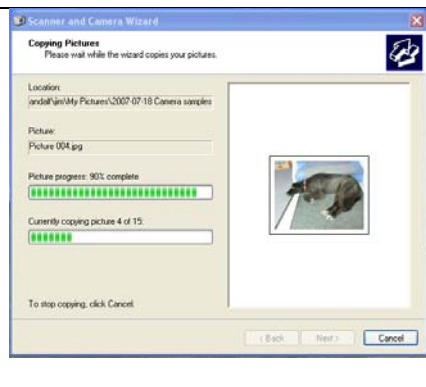
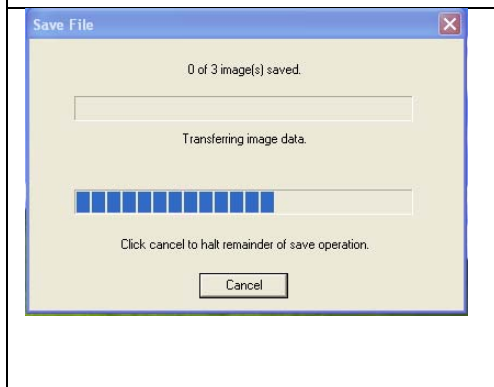
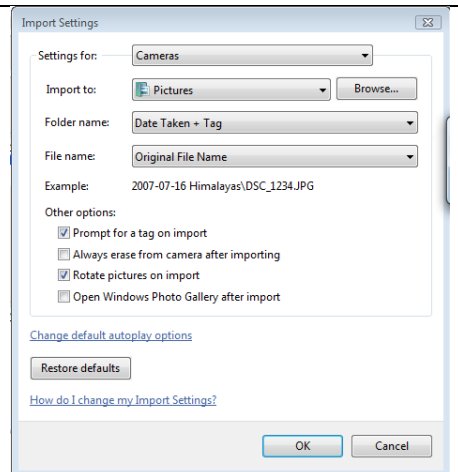
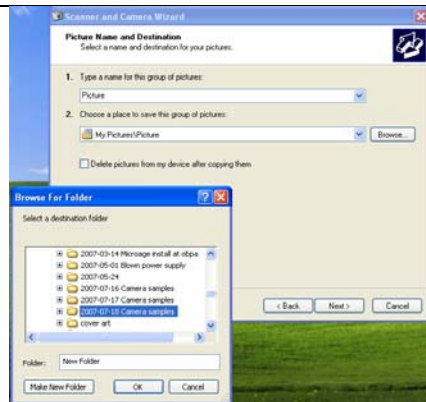
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|  |  |  |
| <p>Secure Digital or MultiMediaCard up to 4GB King of the mountain</p> | <p>CompactFlash up to 8GB has controller built in can contain drive</p> | <p>xD-Picture Card and variations up to 8GB some complain it's too small</p> |
|  |  |  |
| <p>Mini SD fits inside an SD holder</p> | <p>Memory Stick and Duo up to 2GB Sony format</p> | <p>SmartMedia up to 128MB DOA</p> |

- b. Discs
 - i. DVD-RW
 - 1. Mini-DVD
 - ii. CD-RW
 - iii. Floppy
 - h. Video
 - i. Video on a digital still camera is always inferior, Stills on an analog or digital video camera is always inferior.
 - ii. Limitations
 - 1. Duration highly dependent on memory.
 - 2. Resolution highly dependent on camera.
 - 3. Generally cannot change zoom once recording starts.
 - 4. Your microphone is a piece of junk.
 - 5. Generally acceptable only for posting on the web.
 - i. Fancy
 - i. Lens cover
 - ii. Electronic image stabilization
 - iii. Waterproof / water resistant
 - iv. Multiple lens
 - v. Flash
 - vi. Facial recognition
 - vii. On camera photo editing
- 7. What is important and useful to you! Read your reviews!
 - b. There are bargains and there is garbage!
 - c. If an article is three months old, it is out of date! Be sure to compare information with what is current!
 - d. A few extra pixels won't make up for:
 - i. Garbage lens
 - ii. Lack of zoom
 - iii. Lack of storage
 - iv. Difficulty to access photos
 - e. Recommended review sites: zdnet.com, pcmag.com, cnet.com and photographic web sites. Not general sites like Consumer Reports who tend to emphasize simplicity over quality.
 - f. Trust reviews from professionals, take user opinions with a large grain of salt as they often are usually written in a state of euphoria or depression and often without a range of experience.
- 8. Transferring your pictures to your computer
 - a. Connection method
 - i. Cable
 - ii. Card reader
 - 1. Internal
 - 2. External
 - iii. Bluetooth
 - b. Software



- i. Windows
 - 1. Vista
 - 2. Xp
- ii. Paint application
- iii. Camera manufacturer's software

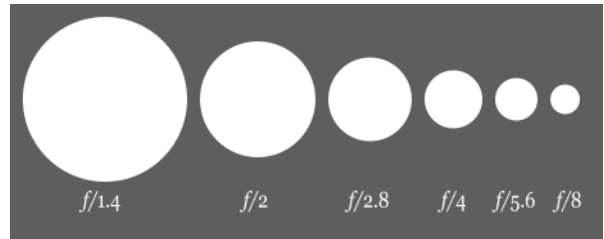
| Canon | Windows Xp | Windows Vista |
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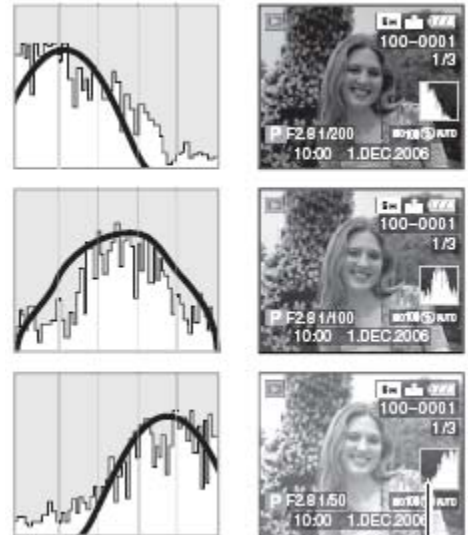
9. Definitions and concepts

- a. Pixel – a single PICTure ELEMent or dot in a digital bitmap. Each pixel is a record of hue and intensity.
- b. Bitmap – a pixel by pixel picture
- c. Vector – picture created by a series of formula, this has nothing to do with digital photography but is the “opposite” of a bitmap picture.
- d. Depth of field - distance in front of and beyond the subject that appears to be in focus.
- e. Exposure - the total amount of light allowed to fall on the image sensor and is computed from exposure value (EV) and the brightness of the scene. Positive values allow more light.
- f. Shutter – device allowing light to pass onto film or amount of time sensor is read.
- g. Shutter lag – time between pressing the shutter release and camera responds. Shutter lag is bad.

- h. Aperture – the size of the opening allowing light into the camera, measured in f-number or f-stop (ratio of focal length to aperture diameter). Lower numbers are a larger opening, allowing in more light, reducing time shutter needs to be open. Higher f-stops allow less light and increase the depth of field.



- i. Histogram – a graph that displays black to white across the horizontal axis and number of pixels present on the vertical. A graph bunched to the left tends to be underexposed and bunched right tends to be over exposed.
- j. ISO mimics the sensitivity of the film. The higher the ISO the more sensitive the film for faster shutter times but grainier pictures. Lower ISO speeds give richer, deeper colors.





10. My pictures are blurry!

- a. Practice and slow down! Unlike your 35mm, digital pictures don't cost you anything!
- b. Two hands, tuck your elbows in.
- c. Spread your feet out for a steady stance.
- d. Lean against a wall or other object with your elbows or shoulder.
- e. Don't cover the AF lamp or flash with your fingers.
- f. Use the optical viewfinder so your head helps steady the camera.
- g. Make sure your lens is clean.
- h. Never underestimate the value of a tripod.

11. Storage format

- a. JPEG or JPG (Joint Photographic Experts Group) – most common, compressed image that loses data each time data is stored.
- b. TIFF or TIF (Tagged Information File Format) – compressed data without loss of imagery. In essence it is a JPG without loss. In cameras, it is being replaced by RAW format.
- c. RAW – minimally processed data from sensors in camera, with little processing.

| | |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| JPG from 7MP camera, 1.37MB | TIF from same camera, same settings, 17.0MB |
|  |  |

12. Camera modes are from sophisticated to simple. Different cameras will have different options.

a. "Standard" Modes

- i. Program – AE (automatic exposure) mode determines shutter, aperture and exposure automatically
- ii. Aperture priority – manual aperture selection, automatic shutter speed
- iii. Shutter priority – manual shutter, automatic aperture
- iv. Manual – manual shutter and aperture, exposure automatic
- v. Macro
- vi. Motion picture – video!
- vii. Scene
- viii. Simple
- ix. Playback



b. "Scene" modes are presets which adjust exposure and hue to match the selected scene. Cameras will have different scene modes, but common ones are listed here.

- i. Portrait – low ISO to enhance colors, backgrounds tend to blur
- ii. Scenery – tends to focus on distant objects, no flash
- iii. Sports – high ISO, short shutter times for more distant, speeding subjects
- iv. Night – slow shutter, higher ISO, closer focus - you will need to steady the camera and may notice a slow response time from the camera as it processes.

- v. Sun / snow – adjusts white balance and exposure for getting whiter whites.

13. Common questions and misconceptions

- a. Do pictures slow my computer down?
 - i. No: Pictures aren't in memory, so they should not affect the memory available to applications and not slow it down.
 - ii. Yes: You can fill your hard drive and that may cause problems if you don't have adequate drive space. Rule of thumb is to keep 10% of your drive free.
 - iii. Yes: lots of photo manipulation may fragment your files. Defragmenting occasionally may help, I recommend monthly.
 - iv. Yes: if you load multiple photo applications they often run applications in the background all the time.
- b. Memory cards last forever.
 - i. Nothing lasts forever, but it is estimated that memory cards will last approximately 100 years and are good for 100,000 to 1,000,000 writes.
 - ii. Memory cards are evolving. It is highly likely we will not be using SD form factors 10 years from now.
- c. Do I need to back up my pictures?
 - i. Hard drives die! They are mechanical and they do crash and die. Backups are necessary.
 - ii. But, I just leave my pictures on the memory card! Memory cards can be corrupted, broken or accidentally erased. They're not practical for long term storage and accessibility.
 - iii. But, I print them! Prints are inferior, fade and can be destroyed or lost. With digital backups, you can recreate a perfect print forever.
- d. I didn't have to worry about losing my photo albums.
 - i. Gee, my mother-in-law is missing one.
 - ii. They can be destroyed by flood or fire.
 - iii. Photos fade.
 - iv. For less than a dollar, you can backup an entire album. For not much more you can reprint your favorite photo and it will look perfect, forever.
- e. Why does it take so long to take a picture?
 - i. Are you setting focus, aperture and exposure by holding your button halfway?
 - ii. Is your camera junk?

14. Pictures beyond the basics

- a. Focus
 - i. Automatic
 - 1. Most cameras use an infrared light to autofocus, especially in low light conditions. Often this can be turned off and the camera relies on processing from the sensor which is slower.
 - 2. Many have multiple focal methods which increase the range of the area analyzed. More range will lead to better automatic

focusing. Smaller areas will lead to more control and faster focusing.

3. Continuous autofocus does eat your battery.

ii. Manual – allows you to force a focus.

b. Flash

i. Modes – may be controlled through switch or mechanical engagement of the flash



1. Automatic
2. Automatic with red eye reduction (multiple flashes to constrict the pupil)
3. Forced flash
4. Forced flash with slow sync and red eye reduction – slows the shutter to brighten dark backgrounds behind a bright foreground subject
5. Forced flash with red eye reduction
6. No flash

ii. Notes

1. Strength and usable distance vary with camera model, don't waste your flash when you're in the back row at the concert.
2. Shutter speed and ISO settings are adjusted according to flash use.
3. Battery life is greatly reduced by use of flash.
4. Better cameras will allow you to adjust the brightness of the flash.
5. Professional cameras will have hot shoes and pickups for connecting external flashes.

c. White balance – biggest mistake in low light, flash-less situations. Ever notice everyone is orange in the auditorium?

i. Automatic – camera attempts to find what is white based on the range of colors presented in the photo.

ii. Presets

iii. Manual allows user to “show” the camera what is white. Usually involved taking a picture of something “white.”

| | |
|---------------|----------------------------------------|
| AUTO | for auto setting (auto white balance) |
| (Daylight) | for recording outdoors on a bright day |
| (Cloudy) | for recording outdoors on a cloudy day |
| (Halogen) | for recording under halogen lighting |
| (Flash) | for recording with the flash only |
| (White set 1) | for using the preset white balance |
| (White set 2) | |

d. Adjusting exposure

15. Situations

- a. Off center subject
- b. Backlight – subject under exposed: Force flash
- c. Extreme close-ups
 - i. Macro mode
 - ii. Flash techniques
- d. Sports
- e. Auditorium: No flash, use a tripod, manual white balance

f. Playing with settings: effects of shutter speed and aperture on sunset

16. Beyond the basics and fun

- a. Timer – delay the photo so you can get in it!
- b. Burst mode – camera takes multiple pictures per second. Actual speed is limited by the memory processing speed of a particular camera. Multiple modes may determine how many pictures get taken.
- c. Solarize, black & white, sepia... all stuff you can do on your computer!
- d. Panoramic – special tool to help take multiple pictures and help with alignment. Pictures can then be “stitched” together.

17. Storage

- a. Pictures are files
- b. Where are my pictures?
 - i. My Pictures
 - ii. Other
- c. Hard drive structure
 - i. Folders
 1. Creating
 2. Renaming
 3. Deleting
 - ii. Files
 1. Renaming
 2. Selection
 3. Copy
 4. Deleting

18. Backup

a. Media

| Storage type | Size | Capacity priced in MB | Drive cost | Media cost | Cost/MB | Pros | Cons |
|---------------------|-------------|-----------------------|------------|------------|----------|-----------------------------------------------|-----------------------------------------------|
| Internal hard drive | 40 - 750GB | 400,000 | \$140 | \$140.00 | \$0.0004 | fast, reliable, easy to use, capacity | non-removable media |
| External hard drive | 40 - 750GB | 400,000 | \$250 | \$250.00 | \$0.0006 | fast, reliable, easy to use, capacity | non-removable media, location & qty of backup |
| USB flash memory | 128MB - 8GB | 1000 | \$27 | \$27.00 | \$0.0270 | easy to use | not on older Windows, non-removable media |
| DVD-RW | 4.7GB | 4700 | \$45 | \$1.00 | \$0.0002 | reliable, huge, easy to share, may play on TV | not super simple to use, not as universal |
| DVD+R or DVD-R | 4.7GB | 4700 | \$45 | \$0.40 | \$0.0001 | reliable, huge, easy to share, permanent, TV? | not super simple to use, not as universal |
| CD-RW | 680MB | 680 | \$20 | \$0.25 | \$0.0004 | reliable, capacity, easy share, TV? | not super simple to use |

| | | | | | | | |
|--------------|-----------|------|-------|--------|----------|-----------------------------------------------|---------------------------------|
| CD-R | 680MB | 680 | \$20 | \$0.20 | \$0.0003 | reliable, capacity, easy to share, perm., TV? | not super simple to use |
| Zip | 100-750MB | 250 | \$139 | \$9.00 | \$0.0360 | easy to use | cost, not universal |
| Floppy drive | 1.44MB | 1.44 | \$20 | \$0.30 | \$0.2083 | easy to use, easy to share | low capacity updated 8/28/06 |

i. Removable or portable hard drives

ii. CD / DVD

iii. Online services

b. Location

c. Schedule

19. Packing or Wish or Christmas list

a. Charger

b. Spare battery(s)

c. Extra memory cards

d. Laptop

e. Other storage devices

20. Cameras of the future

a. Facial recognition for assisting focus, white balance, exposure and flash.

b. Super sensitive optical sensors – a Korean company is working on a sensor 2000x more sensitive than today's sensors. Imagine clear pictures in near darkness without a flash. Oh, it's already behind projected release schedules.

c. Hydrogen fuel cells for super battery life.

d. Liquid lens for faster focusing with no moving parts???

e. Real camera resolutions in cell phones.

21. Album applications

a. Don't be afraid of Explorer

b. Picasa

c. Many, many more!

22. Photo editor applications

a. Picasa

b. GIMP

c. Adobe Photo Elements

d. Adobe Photoshop