

## Guided Review – AP Computer Science Principles

### Chapter 1 – The Internet

Protocol : agreed upon set of rules for communicating

Bitrate vs. Latency:

- Bitrate: number of bits per second for processing on a computer (transmission capacity)
  - High: good
  - Low: bad
- Latency: delay in receiving information
  - High: means high delay = bad
  - Low: means low delay = good

Binary Numbers and How to convert them to decimal:

- Binary: 10101      Decimal:   21    

_____	_____	_____	_____	_____	_____	_____	_____	_____
			1	0	1	0	1	
128	64	32	16	8	4	2	1	

- Binary: \_\_\_\_\_      Decimal: 425  

_____	_____	_____	_____	_____	_____	_____	_____	_____
			1	0	1	0	0	1
256	128	64	32	16	8	4	2	1

IETF: Internet Engineering Task Force – a group of volunteers that set the basic rules/protocols for the Internet

Net Neutrality: The principle that all Internet traffic should be treated equally

Censorship: control of what can be accessed on the Internet

Layers of Protocols in the Internet: (bits, packets, IP, TCP, DNS):

## Chapter 2 - Digital Information:

Compression: Lossy vs. Lossless

- Lossy: when some data is lost (audio, pictures, videos)
- Lossless: no data is lost, you can get it back to it's original (text) .zip LZW
- Heuristic: problem solving technique (not just compression) where a perfect solution is not possible or takes WAY too much time to do, so we use a solution that is pretty good

Pixels and RGB (dark vs. light)

- Pixel: picture element – a tiny dot that has RGB lights making up it's color
- RGB: red, green, blue, that combine to make colors
- Dark colors: lower numbers (000 = black)
- Light colors: higher numbers (111 = white in binary)
- Hexadecimal: 0-9 and A-F – NOT compression (smaller to human eyes, but still takes up the same amount of space on a computer as 1s and 0s)
  - Example:                   A5
  - $10*16 + 5*1 = 165$
  - \_\_\_\_\_
  - 256 16 1

Digital Divide

- The gap between those who have access to the Internet and those that do not (usually based off of demographics)
- Skews data (big Data) that we see on polls, trends, etc.

Google Trends

- Looking at how often a topic(s) are searched, compared to itself. 100=when that thing was searched the most frequently
- Just because someone searches something, doesn't mean they like it

File Sizes:

Bits – Bytes –	KB	MB	GB	TB	PB
	.txt	.mp3	app, .mov	hard drive	Big Data

## Chapter 3 – Algorithms and Programming:

Algorithm: the set of steps to solving a problem

- The building blocks of algorithms: Sequencing (order of steps), Selection (if statement), Iteration (looping)

Abstraction: letting the lower levels do their jobs, so higher levels can focus on their job

- For example: a function

Parameters: input to a function so that it can work for multiple types of problems

- For example `moveForward(distance)` when you call it you can say `moveForward(4)` or `moveForward(100)`
- Generalized solution

Loops (iteration): repeating stuff

- `for(var x = 0; x < 10; x++)`
- {
  - Repeats this stuff
- }

#### **Chapter 4 – Big Data and Privacy:**

Big Data: data that is so large that you can't analyze/process using normal techniques/technology

- Challenges: digital divide (doesn't adequately represent everyone), storage, analysis

Moore's Law: computing power doubling every 1.5-2 years

#### Cryptography

- Caesar Cipher: shifts the whole alphabet a certain number of letters (Key: the shift #)
- Random Substitution: Assigns each letter to a randomly chosen other letter (can be cracked with frequency analysis)
- Vigenere Cipher: a series of Caesar cipher shifts based on a key word
- Encryption: using the key to encode the message
- Decryption: using the key to figure out (decode) the message
  - Cracking: you don't the key – you are trying to figure out the key to intercept the message (this is what Eve is trying to do)

- Asymmetric: different key to encrypt vs. decrypt
- Public Key Encryption: Use someone's public key to ENCRYPT and then that person uses their personal private key (that only they know) to DECRYPT the message. The public and private key are mathematically related, but it is computationally hard to figure out the private key based off of the public key due to one-way functions like modulo.

#### Modulo

- $47 \text{ mod } 4 = 3$
- $8 \text{ mod } 2 = 0$
- $2 \text{ mod } 8 = 2$

#### Scams

SSL/TLS	DDoS	Phishing (example)	Virus
Secure Sockets layer / Transport Layer Security - An encryption layer of HTTP that uses public key cryptography to establish a secure connection.  (lock sign, https)	Flooding a target with traffic to render it useless	Stealing private info by looking like a legit email/pop-up etc.	a program that runs on a computer to do something the owner of the computer does not intend.

### Chapter 5 – Building Apps:

Array/List

Key Event

For Loop

While Loop

Return Value

Data Type

Global vs. Local Variables

Selection	Iteration	Sequencing

\*Remember to look at old reviews

\*Vocab is key

\*Remember there is a reference sheet for coding – be familiar with how it works