1. What does a state diagram show?
   1. A state diagram shows a programs current status, or state, and where it can go from there.
2. The Light Bot activity demonstrated that computers work by:
   1. Executing one instruction at a time.
3. Why is it a good idea to program a little at a time and test frequently?
   1. So that you can more easily catch errors before they pile up and become hard to find.
4. A Boolean expression, such as an If-Then block in Scratch, executes by:
   1. Checking to see if a condition is true before executing a section of code. If it is false, the code is skipped over and the program moves on.
5. How is a Most Recent variable different from a Fixed variable?
   1. The value of a Most Recent variable changes as the program progresses, while a Fixed variable is assigned once and does not change during the program.
6. Distinguish between and Accumulator and an Aggregator.
   1. An accumulator will add values together into one new value, while an aggregator will gather all the values together, perhaps into a list.
7. How is a Best-so-far variable different from a Most Recent variable?
   1. Best-so-far will check to see if it is better than the current value and will only supersede it if it is. Most Recent will not check against the current value.
8. When would a One-Way Flag variable be used?
   1. A One-Way Flag variable might be used to indicate that a level has been passed in a game.
9. Why is an Agile design process preferable to a Waterfall design process for software design?
   1. It has a shorter development cycle, allows for more frequent client input, and is more responsive to the need for changes during the process.
10. What is an advantage and disadvantage to file compression?
    1. It makes files smaller in size but can cause them to lose detail (if compression is lossy).
11. Many variables have a maximum value of 255. What does that tell you about the memory used for that piece of information?
    1. One byte, or eight bits, are being used to store the data, because the maximum value of eight bits is 255.
12. How is a color stored as digital information (RGB)?
    1. 3 bytes are used, one for Red, one for Green and one for Blue. Each of those three colors can have a minimum value of 0 and a maximum value of 255. The final color is the mix of the three component colors.
13. Distinguish between an event and an event handler.
    1. An event is something happening, such as a mouse-click. An event handler is code that responds to the event handler, such as following a hyperlink when it has been clicked.
14. Explain each part of this line of Python code: **import** **matplotlib.pyplot** **as** **plt**
    1. **import** is a command to bring in a library or module to use in a Python program
    2. **matplotlib** is a library package that provide 2D plotting in Python
    3. **pyplot** is a module in **matplotlib**
    4. **as** **plt** is a short name given to the **matplotlib.pyplot** module so it can be conveniently called in the program
15. How are int, float, boolean , and string data types different?
    1. int are integers – whole numbers and their opposites
    2. float are any real numbers (includes decimal point)
    3. Boolean are True or False
    4. string are any characters, alphanumeric or symbols
16. What does def do in Python?
    1. Starts a function definition
17. How is a Python function called (executed)?
    1. A function is called by invoking its name followed by arguments for the function in parentheses. If no arguments are required, then the parentheses are empty.
18. Why is a Boolean expression also called a conditional?
    1. It checks to see if a condition is met. If the condition is met, the expression is True and the assigned code executes. If the condition is not met, the expression is False and the code moves on.
19. What is the difference between using a + to concatenate vs using a + for numeric addition?
    1. Concatenation joins two or more strings together; numeric addition returns a sum of numbers
20. How would you get Python to return the 4th element a list called items?
    1. items[3]
21. How is a tuple different from a list?
    1. A tuple is immutable, meaning it cannot have any of its members reassigned after it is created.
22. What will be returned by the following expression?

range(3)

* 1. 0, 1, 2

1. What will n be in the 3rd time through this for loop?

**for** n **in** range(5):

* 1. 2

1. How long with the following while loop run?

while raw\_input() != winner:

* 1. Until the value of the raw\_input is the same as the value of winner.

1. When using Git, what is a commit?
   1. It is a saved checkpoint in development of code.
2. What is data abstraction?
   1. Ignoring the details of how data, such as letters, numbers or sounds, is represented, stored and retrieved.
3. What is procedural abstraction?
   1. Ignoring how instructions in a program are executed.
4. What makes up a UML (Unified Modeling Language) Diagram for a class?
   1. The class name, the attribute names, and the method names
5. What happens when a class is instantiated?
   1. An object of that class, having the predetermined attributes and methods, is created.
6. For an ndarray image object named img, what information will len(img) give you?
   1. It will give the number of rows in the array, which is the height of the image
7. For an ndarray image object named img, what information will len(img[0]) give you?
   1. It will give you the length of the first row for array, which is the width of the image.
8. What would you input to determine the Red component of the 20th pixel in the 10th row of the image img?
   1. img[9][19][0]
9. What does the alpha channel control?
   1. Opacity
10. What is the purpose of a mask when using the paste method of PIL?
    1. It determines what areas of the pasted image to make transparent and what areas to make opaque.
11. A field of CS that focuses on how computers and humans communicate with each other.
    1. HCI
12. The pattern that separates a program in to discrete components of data, observer, and controller.
    1. MVC
13. How do computers send large amounts of data over a network?
    1. Splitting the data into packets
14. How is an IPv4 address formatted?
    1. Four 8-bit numbers (0-255) separated by decimal points.
15. What is the purpose of DNS?
    1. To provide a human-friendly address for internet destinations.

<http://samplehs.pltwcs.org/students/bkiGag3/sample.php?f=2>

1. What is the scheme and protocol?
   1. https (secure http)
2. What is the top level domain?
   1. .org
3. What is the resource?
   1. sample.php
4. What is f=2?
   1. Parameter key and value
5. What feature of web pages tracks who you are and where you have been?
   1. Cookies
6. What are the automated programs the crawl the web for search engines called?
   1. Spiders or webcrawlers
7. SYN 6, ACK 7, SYN 34, ACK 35
   1. TCP Handshake
8. When navigating to drive.google.com, what tells you the address for google?
   1. .com name server
9. What group develops web standards?
   1. W3C (World Wide Web Consortium)
10. What group coordinates the assignment of IP addresses and Domain Names?
    1. ICANN (Internet Corporation for Assigned Names and Numbers)
11. How do you properly close the body section of an HTML document?
    1. </body>
12. What tool external to a webpage can specify things like font and background colors?
    1. CSS (Cascading Style Sheet)
13. If you want to send a secure message to someone else using Public Key encryption, what do you use to encrypt the message?
    1. The recipients public key
14. Who issues SSL certificates?
    1. Certificate Authority
15. JavaScript is an example of
    1. Client Side scripting
16. What language is commonly used for server-side scripting?
    1. PHP
17. This is used to uniquely identify each entry in a MySQL table.
    1. Primary key
18. What is a query?
    1. A command to retrieve data from tables
19. Why do you use a JOIN command?
    1. To combine data stored across multiple tables
20. What is software designed to do harm called?
    1. Malware
21. The field of CS concerned with identifying and reducing vulnerabilities to attacks
    1. Cybersecurity
22. A histogram is a visualization of data that shows this
    1. Frequency
23. Any tool that uses a graph or picture to extract meaning from data is called a
    1. Visualization
24. A model that programs individuals to follow specific rules with certain parameters so as to observe behavior.
    1. Agent Based Simulation
25. Behavior that appears suddenly without being specifically programmed is referred to as
    1. Emergent behavior
26. A pattern that emerges that is both self-similar and infinite in detail
    1. Fractal