Arduino LightBox Study Questions 1: Sections 1-6 and 19

1. *How many milliseconds are in one second?*

2. *What symbol ends an instruction in C?*

3. *What are the two symbol configurations that define a comment?*

4. *Is the C language case sensitive?*

5. *What do the curly brackets do?*

6. *What is curly bracket hell?*

7. *How can variables be useful?*

8. *How is a constant ("const") different from a variable?*

9. *What does the instruction pinMode(led, OUTPUT); do?*

10. *When is the setup() routine executed?*

11. *How many times is the loop() routine executed?*

12. *What two routines are required in every sketch?*

13. *Is the instruction pinMode different from the instruction PinMode? Why?*

14. *What is the 16-bit datatype?*

15. *Give an example of a variable declaration.*

16. *What type of variable is used for non-integer numbers?*

17. *What is a global variable?*

18. *Where are global variables declared?*

19. *What is the index number for the first element of an array?*

20. *Write a conditional statement to test if variable "a" is greater than twice variable "b".*

21. *Logically, what does TRUE && FALSE equate to?*

22. *Logically, what does TRUE || FALSE equate to?*

23. *In Greek mythology, who was Sisyphus and what did he spend eternity doing?*

24. *What is the gist of Occam's razor?*

Arduino LightBox Study Questions 2: Sections 7-9 and Exercise 1

1. *Which ports on the Uno are used for controlling the LEDs on the LightBox?*

2. *To be interpreted as a logic HIGH, what must the voltage on a digital input port exceed?*

3. *To be interpreted as a logic LOW, what must the voltage on a digital input port be less than?*

4. *What does LED stand for?*

5. *Which LED lead is the anode?*

6. *In the Arduino C language syntax, do you need to include the A or D when referring to a port?*

7. *The Analog to Digital converter converts a 5v input to what number?*

8. *The Analog to Digital converter converts a 2.5v input to what number?*

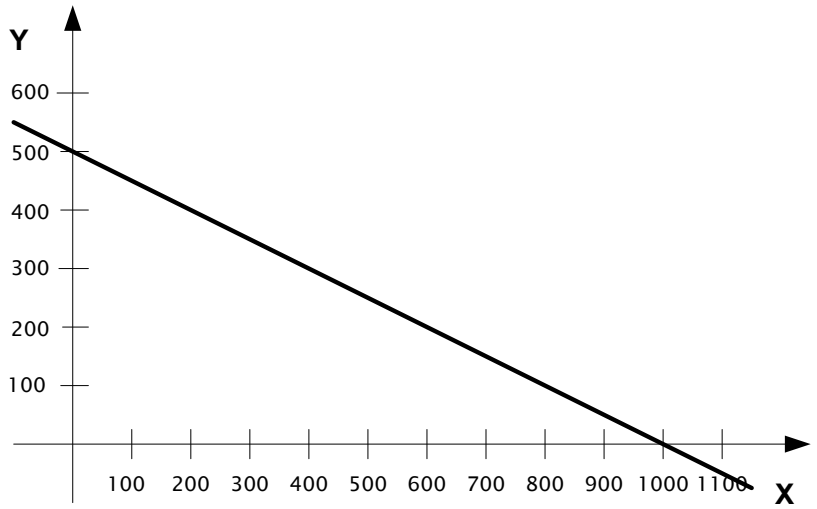
9. *Describe your reset sequence from exercise 1.*

Arduino LightBox Study Questions 3: Section 10 and Exercise 2

1. *What does the keyword "void" signify?*

2. *What is the general equation of a line?*

3. *What is the equation for this line?*



4. *What is a local variable?*

5. *Where are local variables declared?*

6. *Where are local variables used?*

7. *Where are global variables used?*

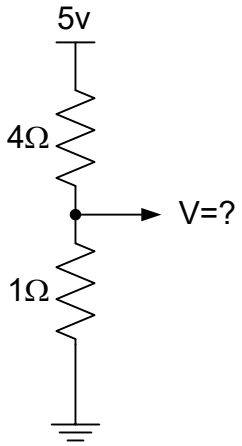
8. *In Exercise 2, how many lines of code are in your setup() routine after using a subroutine? What role did the parameter in your subroutine perform?*

Arduino LightBox Study Questions 4: Section 11-14 + Exercises 3&4

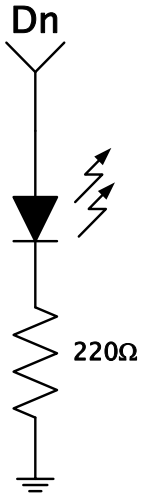
1. *State Ohm's Law.*

2. *What does Kirchhoff's Current Law state?*

3. *In the following circuit, what is the voltage at the unloaded node V?*



4. *In this circuit, the voltage across the LED is 2.8v and the voltage at Dn is 5v. How much current flows through the LED?*



5. *What material is our photo cell made of?*

6. *What does a photo cell sense?*

7. *The resistance of a photocell is proportional to what?*

8. *What circuit do we use to sense a photo cell?*

Arduino LightBox Study Questions 4 (cont): Exercises 3&4

---------- Exercise 3 questions ----------

9. *What is the digital representation of the maximum and minimum voltage read from the photo cell?*

10. *What is the equation for Vdigital in terms of Vanalog for the Vdigital vs. Vanalog plot on page 22?*

11. *Using that equation, what is the corresponding* ***analog voltage*** *for the maximum and minimum digital voltage read from the photo cell?*

12. How much current flows in a 10kΩ resistor connected between 5v and GND?

---------- Exercise 4 questions ----------

13. *What is the equation you used to convert from sensed voltage to delay time in exercise 4?*

14. What physical characteristic of the blinking LEDs does the slope of that line determine?

Arduino LightBox Study Questions 5: Section 15,16 + Exercise 5&6

1. *Name one use for a potentiometer.*

2. *What circuit is contained within a potentiometer?*

3. *What does PWM stand for?*

---------- Exercise 5 questions ----------

4. *What is the maximum and minimum voltage generated by the potentiometer?*

5. *What is the name of the variable you used to define the port in analogRead()?*

6. *How does the potentiometer compare to the photo cell, qualitatively?*

----------Exercise 6 questions ----------

7. *What value did you use to scale the potentiometer reading for PWM (analogWrite) use?*

8. *Comment on the dynamic range of brightness achieved.*

Arduino LightBox Study Questions 6: Section 17 + Exercise 7

1. *What is the decimal value of 1011_2 ?*

2. *What is the maximum value in decimal of a 4-bit number?*

---------- Exercise 7 questions ----------

3. *What is the largest binary number you can display using the 8 LEDs?*

4. *How did you scale the potentiometer value?*

5. *What binary number is displayed when the potentiometer is at half scale?*

6. *What does the modulo operator (%) do?*

Arduino LightBox Study Questions 7: Section 18 + Exercises 8 & 9

1. *What are the names of the two pushbuttons on the LightBox?*

2. *Where do the pull-up resistors for the pushbuttons reside?*

3. *What is an "interrupt"?*

4. *What is a "falling edge"?*

5. *What is a "volatile" variable?*

---------- Exercise 8 questions ----------

6. *What is "bounce"?*

7. *How often do you see your variable increment by more than one?*

---------- Exercise 9 questions ----------

8. *What are the units of the delay() function argument?*

9. *What are the units of the delayMicroseconds() argument?*

10. *How many microseconds delay did you need for your debounce?*