MODULE SIX: WHILE LOOPS

While loops have an initial state, a test condition, a body, and an ending state. Identify each component in the following while loop:

```
int counter = 0;
int max = 5
int a = 1;
int b = 5;
while (counter < max){
        System.out.print(a+b + " ");
        a = 10 * a;
        b = b+2;
        counter +=1;
}
```

TRACE:

1. counter = 0, max = 5, a = 1, b = 5: print 6
2. counter = 1, max = 5, a = 10, b = 7: print 17
3. counter = 2, max = 5, a = 100, b = 9, print 109
4. counter = 3, max = 5, a = 1000, b = 11, print 1011
5. counter = 4, max = 5, a = 10000, b = 13, print 10013
6. counter = 5, max = 5, a = 100000, b = 15. counter not < max → stop.

Final output: 6 17 109 1011 10013

VARIATIONS: How does the output change...

1. if we remove the counter +=1 statement?
2. if we change the counter +=1 statement to counter +=2? to counter +=5?
3. if we change max to 100 and keep all else the same?
4. if we put the print statement at the end of the loop instead of the beginning?

CHALLENGE ONE: STARS

1. Draw a horizontal line of 20 stars. A horizontal line of 3 stars looks like ***
2. Draw a vertical line of 20 stars. A vertical line of 3 stars looks like:
   *
   *
   *
3. Draw a diagonal line of 20 stars. A diagonal line of 3 stars looks like
   *
    *
     *

4. Draw the letter W in stars
5. BONUS: Draw a Tic - Tac - Toe Board in stars. Each line should be 26 stars long

BONUS CHALLENGE TWO: FIBONACCI

The Fibonacci numbers are a sequence of numbers such that each number, starting at the third number, is the sum of the two numbers preceding it. The first two numbers are 1, 1. For example, the first 10 fibonacci numbers are: 1, 1, 2, 3, 5, 8, 13, 21, 34, 55. Print out the first 20 fibonacci numbers by using a while loop.