Worksheet 4 Checked: _____ **Name:** _____

1. What are the two attributes that define a data type?

(a)

(b)

2. Circle all *illegal* Java identifiers:

a)	`x`	e)	`short`	i)	`12MonthTotal`
b)	`formula1`	f)	`tiny`	j)	`margin-cost`
c)	`average_rainfall`	g)	`total output`	k)	`b4hand`
d)	`%correct`	h)	`aReasonablyLongName`	l)	`_stk_depth`

3. Indicate the **value** and **type** — ***i*** (int) or ***d*** (double) — for each of the following expressions:

Expression	Value	Type
`2 + 3`		
`19.0 / 5`		
`19 % 5`		
`19 / 5`		
`3 * 6.0`		
`2 % 7`		

4. By applying the appropriate precedence rules, evaluate the following expressions:

(a) `6 + 5 / 4 - 3` ☐

(b) `6 + (5 / 4) - 3` ☐

(c) `6.0 + 5 / 4 - 3` ☐

(d) `6 + 5.6 / 4 - 3` ☐

(e) `2 + 2 * (2 * 2 - 2) % 2 / 2` ☐

5. In Lab 4 you'll be displaying the digits of an integer in `Reverse`. Complete the following `Reverse` test suite table, adding a few of your own inputs and expected output:

Input	**Expected Output**
1234	4321
4321	
10	

6. The general algorithm to display the digits of an integer in `Reverse` is:

(a) Prompt for and get a `number` from user (integer)

(b) Step through the digits of `number` in reverse, displaying each digit as it is extracted.

Give an algorithm for the second step, "Stepping through `number` in reverse & display each digit." It will need to repeatedly (a) display the units digit, then (b) *lop the units digit off* of the `number`.

7. Also in Lab 4 is an exercise to display a triangle in the lower left corner of the graphics window composed of a number of blocks. Give the Java statements which:

(a) Stores the width of the graphics window in a variable named `wWidth`:

(b) Stores the height of the graphics window in a variable named `wHeight`

(c) Establishes a variable, `maxBlocks`, set to the current value of the slider.

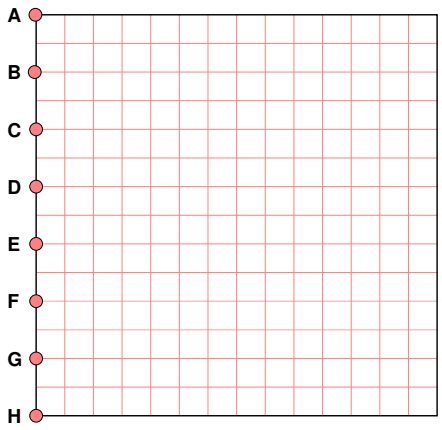
(d) Calculates and stores in `bWidth`, the width of one block such that `maxBlocks` blocks fits exactly into a window `wWidth` wide.

(e) Calculates and stores in `bHeight` the height of one such block.

(f) Establishes the nested loops to fill the lower triangle of the graphics window with colored blocks. The outer loop should count through the rows, 0 up to `maxBlocks`. The inner loop, which should count across columns based on which row is being displayed, should create and display a `block` at the current row and column.

8. A `Curve Stitch` is created by placing a vertical line along the left edge of a rectangle, then adding lines with endpoints which "walk" down the side and across the bottom in equal steps. The lab has several pictures of the resulting parabolic shapes.

   (a) In the graph below, add eight straight lines to form a curve stitch. There are eight equally spaced points – labeled `A` through `H` – shown along the left side of a rectangle representing a graphics window. Find the eight corresponding, equally spaced points along the bottom of the rectangle, label them `A` through `H`, then use a straight edge to connect these points to form a curve stitch. The first line should lie along the left edge of the rectangle, and the last one along the bottom.

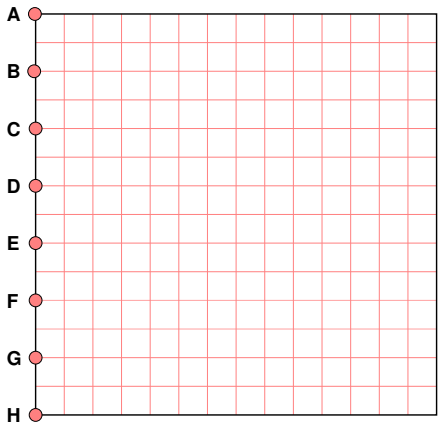


   (b) There are eight lines and the graph is 14×14 units. Why are Δx (change in bottom endpoints) and Δy (change in left endpoints) both equal to $\frac{14}{7} = 2$? (Why not $\frac{14}{8}$?)

   (c) **Careful** on this one. Given n (number of lines), `W` (window Width), and `H` (window Height), how are Δx and Δy determined?

`double deltaX =` ☐ `double deltaY =` ☐

9. Draw a *Pyramid* of 2×2 unit blocks in the graph below. There should be seven blocks along the bottom, then six blocks centered on top of those, five in the next row, and so on.



   How much shorter overall (in terms of units = one of the small squares) is each row from the previous?

   ☐

   How many units should each row be ***offset*** from the one preceding it in order to keep them all centered?

   ☐