

BOMBASTIC BEANAGE

Project Overview

Boolean Expressions are systems of logical statements usually resulting in true or false. In java, booleans are a data type and expression that have countless uses for programs, such as comparing variables or deciding pathways for code using if-statements. With such wide usage, an equally wide toolset is needed as well. For Booleans, their toolbelt is the usage of relational operators, some commonly used in math.

Some examples are

Operator	Meaning	Result
A>B	Greater than	If A is greater than B, returns true. Anything else returns false.
A>=B	Greater than or equal to	If A is greater than B or equal to B, it returns true. Anything else returns false.
A<B	Less than	If A is less than B, then it returns true. Anything else returns false.
A<=B	Less than or equal to	If A is less than B or equal to B, it returns true. Anything else returns false.
A==B	Equal to	If A is equal to B, then it returns true. Anything else returns false.
A!=B	Not equal to	If A does not equal B, it returns true. Anything else returns false.

(The “!” operator can be applied to a conditional to change its condition to the opposite of what it currently is. For example, if the condition is A>B, then using parentheses, the conditional can check if A is not greater than B by writing it as !(A>B).

One way Booleans take coding a step further is their usage in if statements. If statements are clause-based segments of code that control the flow of a program. When the condition stated inside the if statement is met, then the code inside the statement is executed. Two other useful tools that come along with if statements are else if statements and else statements. An else if statement usually follows an if statement, and if the condition of the initial if

statement is not met, then the else if statement condition is checked. Finally, if neither is met, then the else statement segment is executed. Check the table below for the proper formatting of if statements and their counterparts.

Statement format	Meaning	Example/Result
<code>if (condition) { code }</code>	If the condition in the parentheses is met, then the code executes. If not, nothing happens.	<code>if (1==2) { System.out.println ("Wow, I'm bad at math."); } Result: Nothing</code>
<code>else if (condition) { code }</code>	If the condition in the initial if statement is not met, then the conditional in the parenthesis is checked, and if it is met, the code segment runs. Otherwise, nothing happens.	<code>else if (1!=2) { System.out.println("Yay , math works."); } Result: Prints out statement.</code>
<code>else { code }</code>	If neither of the conditions are met in the previous two statements, then the code in the else statement runs.	<code>else { System.out.println("Ok, now I'm really bad at math."); } Result: Nothing</code>

Now, apply the information provided here to the activities found in the zip file. Best of luck on your beantastic journey!

Activities

Activity 1

Farmer Pontiniqua Jetski the 9th wants to plant a field with an ideal soil ph for soybeans. Soybeans grow in an idealistic ph range of 6.3 to 6.5. Pontiniqua measures his soil ph and finds it is 5.4. Assuming an acreage of 10 acres, 12 tons of agricultural limestone is needed to bring 10 acres of soil up 1 ph. Finish completing the variables and print statements to see if Pontiniqua has proper soil Ph or if he needs agricultural limestone.

Activity 2

Farmer Owen Levinson Gould wants to buy fertilizer for his soybean field. Assuming a field acreage of 15 acres and an average bushel rate of 60 per acre, how much fertilizer should Owen use? Remember, that, per bushel, soybeans remove 1.15 pounds of K_2O , so 60 bushels will remove 69 pounds of K_2O per acre. However, muriate of potash, the fertilizer used on Owen's field, contains only about 60 percent K_2O by mass, meaning 115 pounds of muriate of potash(0-0-60) must be used per acre. However, Owen Levinson Gould is not a precise farmer and fertilized his field randomly. Finish the boolean expression to check if Owen adequately fertilized his fields.

Activity 3

Farmer Jebadiah Jonah Jahovius the seventh has 25 acres of land upon which he wants to plant soybeans. Assuming a row width of 15 inches, an average crop emergence of 80 percent per foot of seedlings, and an average planting of 5 seeds per foot, write a boolean expression to check if 4,000,000 seeds are enough to plant Jebadiah's field. Additionally, Jebadiah wants to know if his fields can yield 3,000 bushels of Soybeans. Write a boolean expression to check if his fields will return this yield. Keep in mind, a bushel is 60 pounds of soybeans, and on average, a soybean plant produces around 75 pods per plant with an average of 3 seeds per pod with each seed weighing .00529 ounces. Write any variables as needed.

Activity 4

Farmer Alfonso Jones the third wants to store 69 billion soybeans in a grain silo. Write a boolean expression to check if Alfonso's silo will store the beans and return true or false depending on the answer. Assuming each bean is perfectly spherical and of equal diameter, the volume efficiency of spheres is about 64 percent. The formula for the volume of a sphere is $\frac{4}{3}\pi r^3$ and the volume of a cylinder is $\pi r^2 * h$

Activity 5

Farmer John Uvuvwevwevwe Onyetenyevwe Ugwemubwem Ossas has managed to produce a sizeable 8,000 bushels of soybeans this year. Farmer John wants to keep about 2 percent of his seedlings for germination the following year, so he wants an estimate of how much he can sell the rest of the beans for. This year, a bushel of soybeans sells for \$14.32 with Farmer John receiving about 12% of the profit. In order to improve his harvesting time the following year, Farmer John wants to purchase a new combine. John can either buy combine A, an amazing 2022 John Deere X9 1100 costing \$1,043,978, and a less amazing but still capable combine B, a 2019 John Deere S780 costing

\$379,900. Assuming Farmer John applies for a 5-year Farm Storage Facility Loan with a down payment of 1.875%, write a boolean expression to check what combine if any, Farmer John can afford.

Key

Activity 1

Possible Student Answer:

```
J A1Key.java > ...
1 public class A1Key {
2     private static boolean ph = false;
3     private static boolean limestone = true;
4     public static void main(String[] args){
5         System.out.println("Does Pontiniqua have proper ph? \n" + ph);
6         System.out.println("Does Pontiniqua need limestone? \n" + limestone);
7     }
8 }
9
```

Activity 2

Possible Student Answer:

```
J A2Key.java > A2Key > main(String[])
1 public class A2Key {
2     private static int fertilizer = (int)(Math.random()*1325 + 500);
3     public static void main(String[] args){
4         System.out.println("The amount of fertilizer added is: " + fertilizer + " pounds.");
5         System.out.println(fertilizer>=1725);
6     }
7 }
8
```

Activity 3

Possible Student Answer:

```

J A3Key.java > A3Key > main(String[])
1 public class A3Key {
2     private static double fieldAcreage = 25;
3     private static double rowSpacing = 15; //Inches
4     private static double beanWeight = .00529; //Oz
5     private static double seedsRequired = 4356613; //Calculated from problem, feel free to use above variables in code, just made it more concise here
6     private static double seeds = 4000000;
7     private static double predictedBushels = 3000;
8     private static double actualBushels = 4321; //Calculated from problem, feel free to use above variables in code, just made it more concise here
9     private static boolean yesNoBeans;
10    private static boolean yesNoBushels;
11    Run | Debug
12    public static void main(String[] args) {
13        if (seedsRequired > seeds){
14            yesNoBeans = false;
15            System.out.println(yesNoBeans);
16        }
17        else {
18            yesNoBeans = true;
19            System.out.println(yesNoBeans);
20        }
21        if (actualBushels >= predictedBushels) {
22            yesNoBushels = true;
23            System.out.println(yesNoBushels);
24        }
25        else {
26            yesNoBushels = false;
27            System.out.println(yesNoBushels);
28        }
29    }
30 }

```

Activity 4

Possible Student Answer:

```

J A4Key.java > A4Key > main(String[])
1 public class A4Key {
2     private static double beans = 6900000000.0;
3     private static double beanDiameter = .008; // M
4     private static double siloHeight = 50; //M
5     private static double siloDiameter = 27; //M
6     private static double siloVolume = 18321.76; //Calculated from problem with packing efficiency in mind
7     private static double beanVolume = .00000268; //Calculated in meters
8     private static boolean yesNoBeanVolume;
9     Run | Debug
10    public static void main(String[] args) {
11        if ((beans * beanVolume) > siloVolume) {
12            yesNoBeanVolume = false;
13            System.out.println(yesNoBeanVolume);
14        }
15        else {
16            yesNoBeanVolume = true;
17            System.out.println(yesNoBeanVolume);
18        }
19    }
20 }

```

Activity 5

Possible Student Answer:

J A5Key.java > A5Key > main(String[])

```
1 public class A5Key {
2     private static double averageBushelPrice = 14.32; //Dollars
3     private static double bushels = 8000;
4     private static double combineA = 1043978; //Dollars
5     private static double combineB = 379900; //Dollars
6     private static double profit = 13747.20; //Dollars
    Run | Debug
7     public static void main(String[] args) {
8         System.out.println(x: "What can farmer John afford?");
9         if (profit >= (combineA * .01875)) {
10             System.out.println(x: "Combine A");
11         }
12         else if (profit >= (combineB * .01875)) {
13             System.out.println(x: "Combine B");
14         }
15     }
16 }
17
```