

Problem 1

Year of Astronomy

2 points

JAVA: program name must be prob01.java
C/C++ program name must be: prob01.exe

Task Description

In 1609 Galileo turned his telescope up to the night sky and observed moons in orbit around Jupiter and craters on Earth's moon. What he saw (and wrote) revolutionized science and the rest of the world as well. In commemoration of the 400 years since his first observations, the year 2009 has been designated the International Year of Astronomy. You can join the fun by writing a program to calculate attributes of a telescope from its basic measurements.

A telescope is typically composed of two optical elements: the primary or objective, which is usually a large lens or curved mirror, and the eyepiece. The objective is permanently mounted in a tube or truss. Eyepieces, however, are fitted into a focusing tube and can be easily swapped to provide different levels of magnification.

The focal ratio f of a telescope is calculated by dividing the focal length of the objective FO by its diameter D . The exit pupil P (the size of the image that exits the eyepiece) is calculated by dividing the focal length of the eyepiece Fe by the focal ratio f .

$$f = FO / D$$
$$P = Fe / f$$

Sample Input

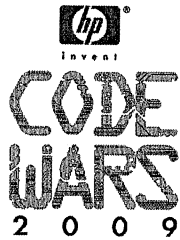
The input will contain three integers: the focal length of an objective, a diameter, and focal length of an eyepiece, in that order.

```
1200
250
28
```

Sample Output

The program must calculate the focal ratio and the exit pupil from the input values. The program should print these values on two separate lines, focal ratio first then exit pupil.

```
4.8
5.8333333
```



Problem 2

Polite Numbers

3 points

JAVA: program name must be prob02.java

C/C++ program name must be: prob02.exe

Task Description

A polite number is a positive integer which can be written as the sum of two or more consecutive positive integers. Other positive integers are impolite.

In years past the Code Wars problem team might have left you to fend for yourself to figure out an algorithm for determining whether a number is a power of two. This year, however, we recognize that the stress of the economic recession is already making life difficult for everyone, so here's a hint: impolite numbers are all exactly powers of two.

For example the numbers 3, 6, 20, and 11 are all polite. On the other hand, the numbers 16 and 128 are impolite because:

$$16 = 2^4 = 2 * 2 * 2 * 2$$
$$64 = 2^6 = 2 * 2 * 2 * 2 * 2 * 2$$

Program Input

The input is a single positive integer value.

4

Program Output

The program must print the input value, followed by a message that says if the number is polite or impolite.

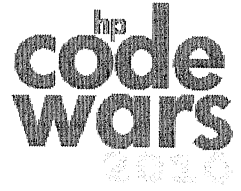
4 is impolite

problem 1

Secure the Perimeter

2 points

JAVA program name must be prob01.java
C /C++ program name must be: prob01.exe



Introduction

A home owner wants to build a low fence around a rectangular part of a garden. The home owner is considering several different designs, and each design includes a rectangle of different dimensions. The cost of materials and time required to install the fence depend on the total length of fencing. Recall that the perimeter P of a rectangle of height H and width W can be calculated with this formula:

$$P = 2 \times H + 2 \times W$$



Write a program to calculate the perimeter of a rectangle.

Sample Input

The input consists of two integers: the height and width of a rectangle.

Example 1:

4 6

Example 2:

8 5

Sample Output

The program must print the perimeter of a rectangle defined by the input values and then exit.

Example 1:

20

Example 1:

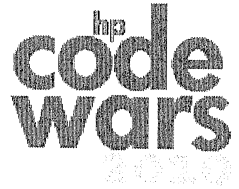
26

problem 2

My Dear Friend VIR

3 points

JAVA program name must be prob02.java
C/C++ program name must be: prob02.exe



Introduction

The most basic law used in circuit analysis is **Ohm's Law**. This law states that the current I through a conductor between two points is directly proportional to the voltage V across the two points, and inversely proportional to the resistance R between them. This relationship is expressed with the following formulas:



$$V = IR \quad \text{or} \quad I = \frac{V}{R} \quad \text{or} \quad R = \frac{V}{I}$$

The most common units of measure are **Volts** for voltage, **Ohms** for resistance, and **Amps** for current. However, for many small electronics projects the current is often less than 1 amp so current is often described in **milliamps**, where 1,000 milliamps equals 1 amp.

Write a program to compute the current in milliamps through a resistor when a voltage is applied.

Sample Input

The input will consist of two floating-point (real) numbers representing a simple circuit. The first number represents a voltage value and the second represent the ohm value of the resistor. Several examples are provided below.

Example 1: 1.45 150

Example 2: 1.17 375

Example 3: 3.49 67

Sample Output

The program must print the current of the circuit in milliamps.

Example 1: 9.6666667

Example 2: 3.12

Example 3: 52.08955

Slash the Budget

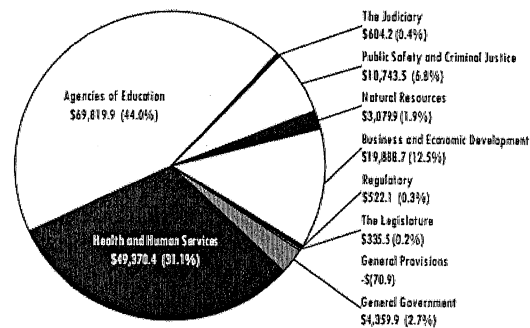
2 points

JAVA program name must be prob01.java
C/C++ program name must be: prob01.exe



Introduction

You have recently been hired as a junior analyst for the 2nd Assistant Deputy to the Budget Director for the State of Texas. Huge budget shortfalls are expected for 2012, so efforts are underway to reduce the state budget to line up with expected revenues (yes, this is a fictional scenario). Your job is to write a program to accept values for expected state revenues and current budget estimates. Your program will output the projected budget shortfall for 2012.



Input

Your program should prompt for the current state budget estimate (an integer value, in billions) and expected state revenue (an integer value, in billions).

```
Enter projected 2012 state budget (in billions): 123
Enter projected 2012 state revenues (in billions): 105
```

Output

Your program should output the projected budget shortfall for the 2012 Texas state budget.

```
Estimated budget shortfall in 2012: 18 billion
```

problem 1
**X Liters of
Ginger Soda**
2 points



Introduction

A chef who owns his own restaurant has earned a reputation for creating fabulous new dishes by combining unusual ingredients. He has formulated a new recipe to release in conjunction with the opening of two new restaurants. The recipe uses ginger soda as one of the ingredients of a mushroom sauce, and the chef is very particular about the quality and flavor of the ginger soda. He found a supplier in Europe that produces a high-quality ginger soda he wants to purchase, but they only sell it in liters and he has specified the required quantity in gallons.

Write a program to convert liters to gallons. There are 3.785 liters in one gallon.

Sample Input

The input will be a single integer representing a number of liters.

144

Sample Output

The program must print the equivalent number of gallons, rounded to the nearest integer.

38






Introduction

In his science fiction novel Ringworld, Larry Niven described an enormous artificially constructed ring orbiting a star. The ring's radius was about 95 million miles and it was nearly 1 million miles wide. The side that faced inward was covered with land and seas and was surrounded by walls 1,000 miles high to retain the atmosphere. The supposed purpose of such a structure was to provide a habitable region with thousands or even millions of times more surface area than an Earth-sized planet.



Write a program to compute the inner surface area of a Ringworld and print the result relative to the surface area of the Earth. To do this you will need to know a few simple facts:

-  the surface area of the Earth is 196.935 million square miles
-  the surface area of a ring is $2 \cdot \pi \cdot r \cdot w$, where r is the ring's radius and w is the ring's width
-  the value of π is about 3.14159265

Sample Input

The input will consist of two real-number values. The first is the radius of the Ringworld, and the second is its width. Both values are given in miles. You might want to use a double data type to ensure your program doesn't lose any precision during calculations.

Example 1

95000000 997000

Example 2

92955887.6 131072

Sample Output

The program must print the inner surface area of the Ringworld relative to the surface area of the Earth. The value must be truncated to an integer value, accurate within ± 1 , followed by the word EARTHS. As you can see below, the Ringworld in the first example (which is the one described in the novel) would have a little over three million times the surface area of the Earth.

Example 1

3021869 EARTHS

Example 2

388726 EARTHS

problem 1
Selling Shirts
1 point

Introduction

A woman who makes and sells clothing has been selling shirts at a local market. She sells these shirts for \$8 more than the cost of the materials and the rental for the booth at the market is \$95 per day. Write a program to calculate the total profit P that she makes in one day based on the number N of shirts sold.

$$P = 8 * N - 95$$

Input

The input is the number of shirts sold in one day. On a really bad day, this number could be zero!

31

Output

The program must print the profit for the day's sales. This value may be positive or negative depending on the value of N .

153



problem **2**
Rocket Science
2 points

Introduction

You can become a rocket scientist today! Model rockets are inexpensive, easy to build, and can reach heights of a few thousand feet.

If you want to calculate the altitude your model rocket will reach, at some point in the calculations you'll probably need to know the mass of your rocket. You can weigh the rocket on a scale, but you may find that your scale shows weight in ounces. That's all good, but the rocket motor's thrust typically is provided in newtons, which is a metric system unit. If so, you may need to convert the ounces to grams before you can calculate the peak altitude.

The conversion is pretty easy using this formula:

$$1 \text{ ounce} = 28.3495 \text{ grams}$$

Input

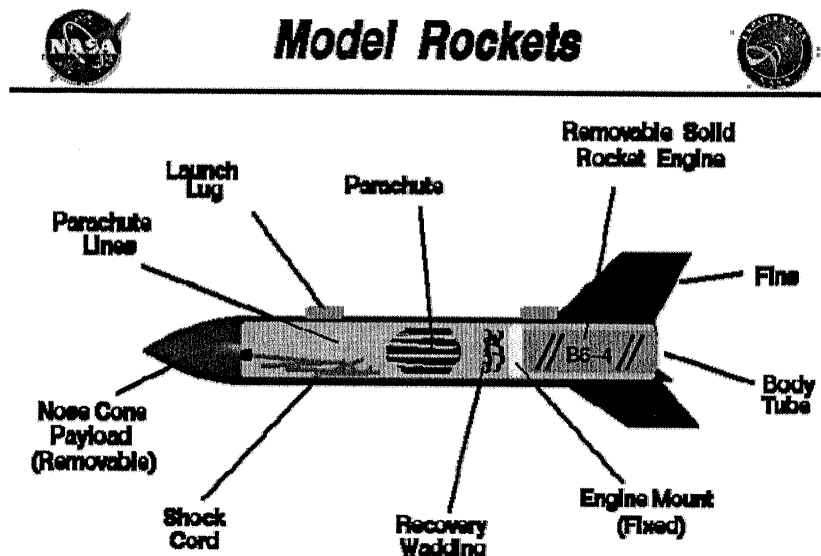
The input is the weight of the rocket, in ounces.

11.3

Output

The program must print the mass of the rocket in grams as shown below. The output must match the expected value to within +/- 1 gram.

320.3496



Notice: This programming problem is not endorsed by NASA, the National Association of Rocketry, or any other rocket-related organization.

problem 4
Go Ballistic
3 points



Introduction

Ballistics (gr. βάλλειν /BALL•ein/, "throw") is the science of mechanics that deals with the flight, behavior, and effects of projectiles. You can calculate the distance that an angry bird (or golf ball or other object) will travel if it is thrown (launched, catapulted, spit, etc.) from a fixed location over a flat surface using the following formula:

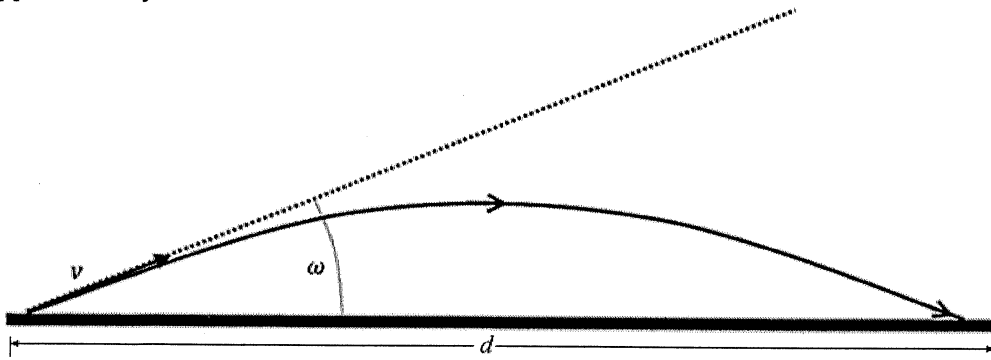
$$d = v^2 \times \sin(2\omega) / g$$

Here v is the initial (thrown) velocity, ω is the angle above horizontal (i.e. the ground), and g is the acceleration of gravity. The acceleration of gravity at the Earth's surface is approximately 9.80665 m/s^2 .

For this program we'll assume that air resistance and the curvature of the Earth are insignificant. Also, we'll measure in units of meters, seconds, and degrees. Your language's $\sin()$ function probably expects angles in radians instead of degrees. If so, you can convert degrees to radians using this formula:

$$\text{radians} = \pi \times \text{degrees} / 180$$

Here π is approximately 3.14159265.



Input

The input will be two floating-point numbers, each on a separate line. The first is the initial velocity of a projectile in meters per second and the second is the launch angle in degrees.

```
63.9
65
```

Output

The program must print the distance in meters that the projectile travels before striking the ground. The answer must match the expected value within +/- 1 meter.

```
318.9591
```

Summary

W R Thompson (1924) was interested in what happened to parasitoid/host populations in areas where parasites were released into an area with a large host density. In the model initially he assumed that the parasitoid would only lay one egg in each host that was found. Thus:

$$\begin{aligned} (\text{No. eggs laid}) &= (\text{Mean Female Egg Compliment}) (\text{No. Females Searching}) \\ P_e &= C \times P \end{aligned}$$

However, this model did not work too well because many parasites are unable to distinguish between parasitized and unparasitized hosts. Thus Thompson's model predicted a higher rate of parasitism than would actually occur. In reality, a host can end up with more than one parasitoid egg and is then "superparasitized".

Thompson's model may not have been very accurate, but it makes a great CodeWars program. Write a program that uses Thompson's model to predict the rate of parasitism for a pair of input values.

Input

The first line of input is the value of C, the Mean Female Egg Compliment, an integer between 1 and 10,000. The second line is the value of P, the Number of Females Searching, an integer between 1 and 100,000.

```
1300
97450
```

Output

The program must print the value of P_e , the Number of Eggs Laid. The answer must match the judge's expected value precisely.

```
126685000
```

Summary

There's a short circuit in the management fabric induced by a power surge from a lightning strike. The engineering team needs you to take an unmarked white van and investigate the numbered input nodes in the fabric.

You must inspect each node by disassembling it. If it is working, you'll send a message back to the laboratory at corporate headquarters and reassemble the node. With the fabric not working correctly you'll be using a low-frequency channel that can only send very short messages. In fact, you can only send a single number.

The management at corporate headquarters would like to see a human-friendly message instead of a single number. So before leaving, you must write a program that reads a single number and writes a friendly message on the screen.

Input

The input is a single integer between one and ten, inclusive.

Example 1:

5

Example 2:

10

Output

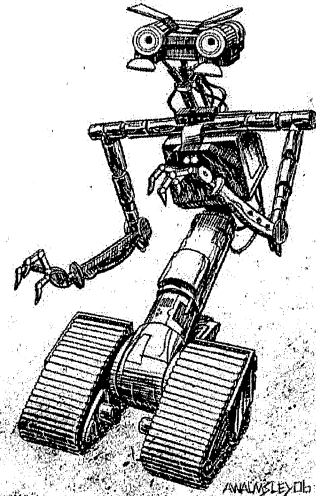
The program must print a sentence in the format shown in the examples below, using the input number written as a word.

Example 1:

Number five is alive!

Example 2:

Number ten is alive!



Summary

In mathematics, the Distributive Law says

$$A \times (B + C) = A \times B + A \times C$$

Write a program to demonstrate the Distributive Law.

Input

There will be three lines of input. The first line has the value for A, the second for B, and the third for C. All values will be positive integers.

```
11
5
4
```

Output

The program must print three lines demonstrating the Distributive Law with the input values. The first line must substitute the values into the equation. The second line must show the result of the first level of evaluation. The third line must show the result of the final evaluation. Follow the pattern shown below.

```
11 x (5 + 4) = 11 x 5 + 11 x 4
11 x 9 = 55 + 44
99 = 99
```

Summary

In the United States, landscaping companies sell various types of soil and gravel by the "yard". This is an abbreviation for a cubic yard, i.e., a cube that is one yard long, one yard wide, and one yard deep.

Now this bit of trivia is important to a suburban gardener who wishes to grow a grape vine in their (ahem) back yard. Grape vines require soil with good drainage, so if the gardener's soil does not drain well they might decide to dig a hole and fill it with a mix of sand and topsoil. Plant spacing is typically published in feet, so the gardener is likely to plan the size of the hole in feet, but needs to order the dirt in "yards."

Write a program to compute the number of (cubic) yards of soil required to fill a hole that is measured in feet. There are three feet in a yard, which equates to twenty-seven cubic feet per cubic yard.

Input

The input consists of three lines, each with a single integer. These are the length, width, and depth of the hole, measured in feet.

4
6
3

*To forget how to dig
the earth and to
tend the soil is to
forget ourselves.*

– Mahatma Gandhi

Output

The program must print the minimum number of (cubic) yards of soil required to fill the hole. Landscaping companies sell soil in whole yards, not in fractional parts, so the answer must be the smallest integer number of cubic yards that will fill the hole.

3

F0
34

NOTE – this is the 2nd of two problems that can be solved and submitted before the start of the CodeWars competition. Teams are **strongly** encouraged to submit this problem **prior** to the start of the competition – hey, it's basically a free point!

Summary

You'll have no chance to win at CodeWars (or life) if you don't know how to do Input and Output properly. You also won't do well at CodeWars if you are rude to your judges.

Write a program to greet your esteemed judges appropriately. Read in the name of a judge and output your greeting in the appropriate format.

If you're confused at this point, go back and re-read your contest instructions.

Input

The input will be your judge's first name, a single word with no spaces:

Wilfred

Output

Welcome your judge with a friendly, creative greeting of some sort that includes the judge's name (does not have to match the below example):

Greetings, O Honorable Wilfred the Magnificent! May I kiss your signet ring?