# Lab: Data Types and Variables

Problems for lab for the ["Technology Fundamentals" course @ SoftUni](https://softuni.bg/courses/technology-fundamentals).

You can check your solutions in [Judge](https://judge.softuni.bg/Contests/1196/).

# Data Types and Type Conversion

## Integer Operations

Read four integer numbers. Add first to the second, divide (integer) the sum by the third number and multiply the result by the fourth number. Print the result.

### Constraints

* First number will be in the range [-2,147,483,648… 2,147,483,647]
* Second number will be in the range [-2,147,483,648… 2,147,483,647]
* Third number will be in the range [-2,147,483,648… 2,147,483,647]
* Fourth number will be in the range [-2,147,483,648… 2,147,483,647]

### Examples

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Input** | **Output** |  | **Input** | **Output** |
| 10  20  3  3 | 30 |  | 15  14  2  3 | 42 |

## Circle Area (12 Digits Precision)

Write program to enter a radius r (real number) and prints the area of the circle with exactly 12 digits after the decimal point:

### Examples

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Input** | **Output** |  | **Input** | **Output** |
| 2.5 | 19.634954084936 |  | 1.2 | 4.523893421169 |

## Elevator

Calculate how many courses will be needed to **elevate n persons** by using an elevator of **capacity of p persons**. The input holds two lines: the **number of people n** and the **capacity p** of the elevator.

### Examples

|  |  |  |
| --- | --- | --- |
| **Input** | **Output** | **Comments** |
| 17  3 | 6 | 5 courses \* 3 people + 1 course \* 2 persons |
| 4  5 | 1 | All the persons fit inside in the elevator.  Only one course is needed. |
| 10  5 | 2 | 2 courses \* 5 people |

### Hints

* You should **divide** n **by** p. This gives you the number of full courses (e.g. 17 / 3 = 5).
* If n does not divide p without a remainder, you will need one additional partially full course (e.g. 17 % 3 = 2).
* Another approach is to round up n / p to the nearest integer (ceiling), e.g. 17/3 = 5.67 🡪 rounds up to 6.

## Centuries to Minutes

Write program to enter an integer number of **centuries** and convert it to **years**, **days**, **hours** and **minutes**.

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 1 | 1 centuries = 100 years = 36524 days = 876576 hours = 52594560 minutes |
| 5 | 5 centuries = 500 years = 182621 days = 4382904 hours = 262974240 minutes |

### Hints

* Use appropriate data type to fit the result after each data conversion.
* Assume that a year has 365.2422 days at average ([the Tropical year](https://en.wikipedia.org/wiki/Tropical_year)).

## Special Numbers

A **number** is **special** when its **sum of digits is 5, 7 or 11**.

Write a program to read an integer n and for all numbers in the range **1…n** to print the number and if it is special or not (True / False).

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 15 | 1 -> False  2 -> False  3 -> False  4 -> False  5 -> True  6 -> False  7 -> True  8 -> False  9 -> False  10 -> False  11 -> False  12 -> False  13 -> False  14 -> True  15 -> False |

## Triples of Latin Letters

Write a program to read an integer **n** and print all **triples** of the first **n small Latin letters**, ordered alphabetically:

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 3 | aaa  aab  aac  aba  abb  abc  aca  acb  acc  baa  bab  bac  bba  bbb  bbc  bca  bcb  bcc  caa  cab  cac  cba  cbb  cbc  cca  ccb  ccc |

### Hint

Perform 3 nested loops from 0 to n-1. For each number num print its corresponding Latin letter as follows:



In **asci** "a" is equal to 97.

## Concat Names

Read two names and a delimiter. Print the names joined by the delimiter.

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| John  Smith  -> | John->Smith |
| Jan  White  <-> | Jan<->White |
| Linda  Terry  => | Linda=>Terry |

# Variables

## Refactor Volume of Pyramid

You are given a **working code** that finds the **volume of a pyramid**. However, you should consider that the variables exceed their optimum span and have improper naming. Also, search for variables that **have multiple purpose**.

### Code

|  |
| --- |
| **Sample Code** |
| <?php $dul = $sh = $V = 0; **echo "Length: "**; $dul = *floatval*(*readline*()); **echo "Width: "**; $sh = *floatval*(*readline*()); **echo "Height: "**; $V = *floatval*(*readline*()); $v = ($dul \* $sh \* $V) / 3; **echo** *sprintf*(**"Pyramid Volume: %.2f"**, $v) . ***PHP\_EOL***; |

### Hints

* **Reduce the span** of the variables by declaring them in the moment they receive a value, not before
* Rename your variables to **represent their** real **purpose** (example: "dul" should become length, etc.)
* Search for variables that have multiple purpose. If you find any, **introduce a new variable**.

## Refactor Special Numbers

You are given a **working code** that is a solution to **Problem 5. Special Numbers**. However, the variables are **improperly named, declared before** they are needed and some of them are used for multiple things. Without using your previous solution, **modify the code** so that it is **easy to read and understand**.

### Code

|  |
| --- |
| **Sample Code** |
| <?php $kolkko = *intval*(*readline*()); $obshto = 0; $takova = 0; $toe = **false**; **for** ($ch = 1; $ch <= $kolkko; $ch++) {  $takova = $ch;  **while** ($ch > 0) {  $obshto += $ch % 10;  $ch = $ch / 10;  }  $toe = ($obshto == 5) || ($obshto == 7) || ($obshto == 11);  $toerez = $toe ? **"True"** : **"False"**;  **echo** *sprintf*(**"%d -> %s"**, $takova, $toerez) . ***PHP\_EOL***;  $obshto = 0;  $ch = $takova; } |

### Hints

* Reduce the span of the variables by declaring them in the moment they receive a value, not before
* Rename your variables to represent their real purpose (example: "dul" should become length, etc.)
* Search for variables that have multiple purpose. If you find any, introduce a new variable