Program that will categorize a single character that is entered at the terminal, whether it is an alphabet, a digit or a special character. *

(**Restriction:** Without math.h)

Sample input	**Sample output**
z	Alphabet
A	Alphabet
8	Digit
*	Special

Program that will evaluate simple expressions of the form- **

<number1> <operator> <number2>

; where operators are (+, - , *, /)

And if the operator is "/", then check if <number2> nonzero or not.

Sample input	**Sample output**
100 * 55.5	Multiplication: 5550
100 / -5.5	Division: -18.181818
100 / 0	Division: Zero as divisor is not valid.

Program that will take the final score of a student in a particular subject as input and find his/her grade. *

Marks	Letter Grade	Marks	Letter Grade	Marks	Letter Grade
90-100	A	70-73	C+	Less than 55	F
86-89	A-	66-69	C		
82-85	B+	62-65	C-		
78-81	B	58-61	D+		
74-77	B-	55-57	D		

Sample input	**Sample output**
91.5	Grade: A
50	Grade: F

.	Program that will construct a menu for performing arithmetic operations. The user will give two real numbers **(a, b)** on which the arithmetic operations will be performed and an integer number (1 <= Choice <= 4) as a choice. Choice-1, 2, 3, 4 are for performing addition, subtraction, multiplication, division (quotient) respectively. **Sample input (a, b, Choice)** | **Sample output** 5 10 3 | Multiplication: 50 -5 10.5 4 | Quotient: 0	*
.	Program that will construct a menu for performing arithmetic operations. The user will give two real numbers **(a, b)** on which the arithmetic operations will be performed and an integer number (1 <= **Choice** <= 4) as a choice. Choice-1, 2, 3, 4 are for performing addition, subtraction, multiplication, division respectively. If Choice-4 is selected, again the program will ask for another choice (1 <= **Case** <=2), where Case-1, 2 evaluate quotient and remainder respectively. **Sample input** | **Sample output** 5 10 3 | Multiplication: 50 -5 10.5 4 1 | Quotient: 0 -5 10.5 4 2 | Remainder: -48 1. Addition 2. Subtraction 3. Multiplication 4. Division 1. Quotient 2. Remainder	**

.	Program that will construct a menu for performing arithmetic operations. The user will give two real numbers **(a, b)** on which the arithmetic operations will be performed and an integer number (1 <= **Choice** <= 4) as a choice. Choice-1, 2, 3, 4 are for performing addition, subtraction, multiplication, division respectively. If Choice-4 is selected, the program will check if **b** is nonzero. If the check is true, the program will ask for another choice (1 <= **Case** <=2), where Case-1, 2 evaluate quotient and reminder respectively. If the check is false, it will print an error message "Error: Divisor is zero" and halt.	***

Sample input	**Sample output**
5 10 3	Multiplication: 50
-5 10.5 4 2	Reminder: -48
-5 0 4	Error: Divisor is zero

.	Program for "Guessing Game": Player-1 picks a number **X** and Player-2 has to guess that number within **N = 3** tries. For each wrong guess by Player-2, the program prints "Wrong, **N-1** Chance(s) Left!" If Player-2 successfully guesses the number, the program prints "Right, Player-2 wins!" and <u>stops allowing further tries (if any left)</u>. Otherwise after the completion of **N = 3** wrong tries, the program prints "Player-1 wins!" and halts. [**Restriction:** Without using loop/break/continue **Hint:** Use flag]	***

Sample input (X, n1, n2, n3)	***Sample output***
5 12 8 5	Wrong, 2 Chance(s) Left! Wrong, 1 Chance(s) Left! Right, Player-2 wins!
100 50 100	Wrong, 2 Chance(s) Left! Right, Player-2 wins!
20	Wrong, 2 Chance(s) Left!

	12 8 5	Wrong, 1 Chance(s) Left! Wrong, 0 Chance(s) Left! Player-1 wins!	

Transportation Service Charge Calculator

You are tasked with developing a program for a local transportation company. The company offers different types of transportation services, each with a different charge per kilometer. The services and their respective charges are as follows:

- **Car**: 500 Taka per kilometer
- **Bus**: 300 Taka per kilometer
- **Bike**: 100 Taka per kilometer

Write a C program that:

1. Asks the user to choose a service by entering 1 for Car, 2 for Bus, or 3 for Bike.
2. Then, asks the user to input the number of kilometres they want to travel.
3. Calculates the total charge based on the selected service and distance.
4. Prints the total charge and service type.

You need to complete the program (uses of switch-case will be appreciated).

Input 1	Output 1
Select the service: 1. Car 2. Bus 3. Bike Enter your choice: 2 Enter the distance: 2.5	You selected Bus. The total charge for your trip is: 750.00

Input 2	Output 2
Select the service: 1. Car 2. Bus 3. Bike Enter your choice: 5 Enter the distance: 5	Invalid service type selected.

Internet Data Package Cost Calculator

You are tasked with developing a program for an internet service provider. The company offers different types of data packages, each with a different charge per GB. The packages and their respective charges are as follows:

- **Basic Package**: 50 Taka per GB
- **Standard Package**: 100 Taka per GB
- **Premium Package**: 150 Taka per GB

Write a C program that:

1. Ask the user to choose a package by entering 1 for Basic, 2 for Standard, or 3 for Premium.
2. Ask the user to input the number of GBs they want to use.
3. Calculates the total cost based on the selected package and data usage.
4. Prints the total cost and the selected package type.

You need to complete the program using **if-else** statements.

Input 1	Output 1
Select the data package: 1. Basic Package 2. Standard Package 3. Premium Package Enter your choice: 3 Enter the number of GBs you want to use: 50	You selected the Premium Package. The total charge for your package is: 7500.00

Input 2	Output 2
Select the data package: 1. Basic Package 2. Standard Package 3. Premium Package Enter your choice: 4	Invalid package type selected.

Einstein's equation for the theory of relativity is as follows: $E = mc^2$
where ***E*** = energy, ***m*** = mass, ***c*** = Speed of light
Write a C program that will take 2 floats (Energy and mass) as input, and print the Speed of Light as output to 3 decimal places.

Sample Input	Sample Output
134.5 150.2	0.946
84.9 12.6	2.596

Write a C program that can calculate the area and perimeter of a rectangle. The system first takes input of a character that can be 'A' or 'P'. If **A** is entered, the program will compute area, and if P is entered, the program will compute perimeter. To compute, the program needs to take two floating point numbers, length and width first.

Formulas:

- *Area of a rectangle: length * width*
- *Perimeter of the rectangle: 2* (length + width)*

Sample Input	Sample Output
A 5.0 4.0	The area of a rectangle is: 20.000000
P 3.0 2.0	The perimeter of the rectangle is: 10.000000

Take three **integers** as input and find the maximum value. If the maximum number is divisible by 2 print "Red Number", or if it is divisible by 3, print "Blue number", or if divisible by both 2 and 3 print, "Purple number" or if it is divisible by neither print "White number".

Sample Input	Sample Output
34 45 40	Blue Number

10 9 7	Red Number

Write a C program that will take three integer numbers as input, and calculate *the maximum value* after using exactly *one addition* and exactly *one multiplication* operation among those numbers. [***Hints****:* Compute values for all three possible combinations (a+ b*c), (b+a*c), and (c+a*b) and find the maximum value.]

Sample Input	Sample Output
1 4 7	Maximum value: 29
-5 0 3	Maximum value: 3
-3 -2 -9	Maximum value: 25

Write a program that will take **a positive integer** as input, find the last digit, and print all the digits from the last digit to digit 9. You must use **switch case statements** and the last digit as its input**.**

Sample Input	Sample Output
54	456789
90	0123456789
9	9
16	6789

The volume of a Sphere is given by the formula: $V = \frac{4}{3}\pi r^3$ and the surface area of a Sphere is given by the formula: $A = 4\pi r^2$, where ***r*** = Radius of Sphere. **Write a program** that will take the radius of a sphere as input, and compute and print the volume and surface area of the sphere. ($\pi = 3.1416$).

Sample Input	**Sample Output**
10.5	Volume = 4849.06 , Area = 1385.45
12.9	Volume = 8992.05 , Area = 2091.17

A function ***f(x,y)*** can be defined as follows:

$$f(x,y) = \begin{cases} x^3 + 5xy & ; x, y < 0 \\ 4y & ; x < 0 \text{ and } y > 0 \\ \frac{1}{(x+y)} & ; x \geq 0 \end{cases}$$

Write a C program to evaluate f(x,y) following above definition. For values that are not in the mentioned range your program should output "Undefined".

Sample Input	**Sample Output**
-3.8 -2.2	-13.072
-0.6 0	Undefined
5 2	0.143

Take three **integers** as input and find the minimum among them. If the minimum number is odd, print "Red Number", otherwise print "Blue number".

Sample Input	**Sample Output**
34 45 40	Even, Blue Number
11 15 17	Odd, Red Number

Write a C program that asks the user to input three numbers representing the lengths of the sides of a *triangle*. **Using if/else statements**, determine and print whether the triangle is valid or not. If the triangle is valid, then print "Valid Triangle.". If the triangle is invalid, print "Invalid Triangle."
[***Hints****:* A triangle is valid if the sum of its two sides is greater than the third side.]

Sample Input	Sample Output
2 9 10	Valid Triangle.
1 2 3	Invalid Triangle.

Write a program that will take the last 4 digits of your student id and an operator as input. The program will determine the **last digit of your student id** and perform an operation on that digit three times, using the **switch case statements.**

Sample Input	Sample Output
1145 *	5 * 5 * 5 = 125
1123 +	3 + 3 + 3 = 9
1128 -	8 - 8 – 8 = - 8
1122 ?	The input is invalid