

Arduino C++ Programming

Advanced Concepts

Comparison Operators

```
x == y (x is equal to y)
x != y (x is not equal to y)
x < y (x is less than y)
x > y (x is greater than y)
x <= y (x is less than or equal to y)
x >= y (x is greater than or equal to y)
```

If Statement

```
if (x > 120) digitalWrite(LEDpin, HIGH);  
  
if (x > 120)  
  digitalWrite(LEDpin, HIGH);  
  
if (x > 120) {digitalWrite(LEDpin, HIGH);}  
  
if (x > 120) {  
  digitalWrite(LEDpin1, HIGH);  
  digitalWrite(LEDpin2, HIGH);  
}  
// all are correct
```

Else Statement

```
if (temperature >= 70) {  
    // Danger! Shut down the system.  
}  
else if (temperature >= 60) { // 60 <= temperature < 70  
    // Warning! User attention required.  
}  
else { // temperature < 60  
    // Safe! Continue usual tasks.  
}
```

Logical Operators

```
if (!x) { // if x is not true
    // statements
}
```

```
if (1 == 1 && 2 == 2) {
```

```
    // statements
```

```
}
```

```
if (x > 0 || y > 0) { // if either x or y is greater than zero
    // statements
}
```

Questions and Exercises

1. Write a program to enter 2 numbers and output the largest number.
2. Write a program to enter 3 numbers and output the largest number.
3. Write a program to enter a number and indicates whether its positive or negative or zero.
4. A valid triangle has a sum of 180 degrees for all its three angle. Input three angles and tell the user if is a valid triangle.
5. Ask for 3 grades from a user. Average them and tell them the average and the letter grade corresponding to the average.
6. Ask a user repeatedly for an animal. If its a cat say IT'S A CAT! Otherwise say IT'S NOT A CAT!

1. Write a program to enter 2 numbers and output the largest number.

```
void setup()
{
  Serial.begin(9600);
  Serial.println("Enter num1: ");
  while(Serial.available() != 0){}
  int num1 = Serial.parseInt();

  Serial.println("Enter num2: ");
  while(Serial.available() != 0){}
  int num2 = Serial.parseInt();

  if (num1 > num2){
    Serial.println(num1);
  }
  else{
    Serial.println(num2);
  }
}
```

2. Write a program to enter 3 numbers and output the largest number.

```
Serial.begin(9600);
Serial.println("Enter num1: ");
while(Serial.available() != 0){}
int num1 = Serial.parseInt();

Serial.println("Enter num2: ");
while(Serial.available() != 0){}
int num2 = Serial.parseInt();

Serial.println("Enter num3: ");
while(Serial.available() != 0){}
int num3 = Serial.parseInt();

if ((num1 > num2 && num2 > num3) || (num1 > num3 && num3 > num2)){
    Serial.println(num1);
}
else if ((num2 > num1 && num1 > num3) || (num2 > num3 && num3 > num1)){
    Serial.println(num2);
}
else{
    Serial.println(num3);
}
}
```


3. Write a program to enter a number and indicates whether its positive or negative or zero.

```
Serial.begin(9600);  
  Serial.println("Enter num: ");  
  while(Serial.available()==0){}  
  int num = Serial.parseInt();  
  
  if (num>0){  
    Serial.println("positive");  
  }  
  else if (num<0){  
    Serial.println("negative");  
  }  
  else{  
    Serial.println("zero");  
  }  
}
```

4. A valid triangle has a sum of 180 degrees for all its three angle. Input three angles and tell the user if is a valid triangle.

```
Serial.begin(9600);  
Serial.println("Enter ang1: ");  
while(Serial.available() == 0){}  
int ang1 = Serial.parseInt();  
  
Serial.println("Enter ang2: ");  
while(Serial.available() == 0){}  
int ang2 = Serial.parseInt();  
  
Serial.println("Enter ang3: ");  
while(Serial.available() == 0){}  
int ang3 = Serial.parseInt();  
  
if ((ang1+ang2+ang3) == 180){  
    Serial.println("Valid triangle");  
}  
else{  
    Serial.println("Not valid triangle");  
}
```

5. Ask for 3 grades from a user. Average them and tell them the average and the letter grade corresponding to the average.

```
Serial.begin(9600);
Serial.println("Enter mark 1: ");
while(Serial.available()==0){}
int mark1 = Serial.parseInt();

Serial.println("Enter mark 2: ");
while(Serial.available()==0){}
int mark2 = Serial.parseInt();

Serial.println("Enter mark 3: ");
while(Serial.available()==0){}
int mark3 = Serial.parseInt();

average = (mark1+mark2+mark3)/3;
Serial.println("Your average mark is "+average);

if (average>=85){
  Serial.println("Your letter grade is A");
}
else if (average>=75){
  Serial.println("Your letter grade is B");
}
else if (average>=65){
  Serial.println("Your letter grade is C");
}
else{
  Serial.println("Your letter grade is D");
}
```

6. Ask a user repeatedly for an animal. If its a cat say IT'S A CAT! Otherwise say IT'S NOT A CAT!

```
Serial.begin(9600);

while (true){
    Serial.println("Enter animal: ");
    while(Serial.available()==0){}
    String animal = Serial.readString();
    if (animal=="cat"){
        Serial.println("IT'S A CAT!");
    }
    else{
        Serial.println("IT'S NOT A CAT!");
    }
}
```