

# Create a program to Prime Factor a number

Hint: This Assignment is About Function Signatures and Prototypes! The only modification to the code provided are to add your name and the needed function prototypes. (And the extra credit.) If you submit a googled answer, you fail.

Use recursion only, no loops! Almost ALL the code is provided in this assignment. A major hint is to look at all of the different calls to the function primeFractor(). From those, you can figure out the missing code.

This is a 1 hour assignment. If you are stuck after 1 hour, eMail me your code and I will guide you.

You MUST use the following main(), unmodified:

```
int main() {  
  
    unsigned int number;  
  
    std::cout << "Enter a number to factor: ";  
    std::cin >> number;  
    std::cout << "The prime factors are: ";  
    primeFactor (number);  
    std::cout << std::endl;  
  
    return 0;  
}
```

Enter a number to factor: 27

The prime factors are: 3 3 3

- OR -

Enter a number to factor: 120

The prime factors are: 2 2 2 3 5

## Hint

The function definition for primeFactor() is the KEY to solving this problem!

- What are the signatures?
- What are its Parameters?
- Why is it / how can it be called with different numbers of parameters?
- Are any default parameters used?

## Base Case

-A number is Prime if it Can only be divided by itself

```
if (num == div){ // It's Prime  
  
    std::cout << div << " ";  
  
    return ;  
  
}
```

## Nominal Factor Case

-You know you found a factor if it's mod is 0 (aka after division the remainder is zero):

```
if ( num % div == 0 ){ // div is a factor  
  
    std::cout << div << " " ;  
  
    primeFactor (num/div, div);  
  
}
```

```
} else {  
    primeFactor (num, div+1);  
}  
return ;
```

### Extra Credit\*

-Extend To produce the following output:

```
Enter a number to factor: 27
```

```
The prime factors are: 3, 3, 3
```

```
Enter a number to factor: 12345678
```

```
The prime factors are: 2, 3, 3, 47, 14593
```

### Extra Extra Credit\*

-Measure the time of execution of primeFactor()

```
Enter a number to factor: 12345678
```

```
The prime factors are: 2, 3, 3, 47, 14593
```

```
This took 0.692 mSeconds.
```

\*Must do Both for extra Credit points