

CPSC1150 Exercise

1. A palindrome is a word that is spelled the same forward and backward, such as “radar”. Write a java static method that will accept a String and will determine whether or not the word is a palindrome. The word “aabbcbbaa” will be considered a palindrome by your method.
2. The four-digit number 3025 has the following property: if the number formed by considering only the first two digits (30) is added to the number formed by considering only the last two digits (25), the total will be 55, and if this number (55) is squared, the result will be the original number. Develop a pseudocode algorithm to find all four-digit numbers having this property. Then translate the algorithm into a java program.
3. The greatest common divisor (GCD) of two numbers is the largest factor of both numbers. For example, the GCD of 54 and 63 is 9. Develop a pseudocode algorithm which will compute the GCD of any two given numbers. Translate your algorithm into a java method.
4. The least common multiple (LCM) of two numbers is the smallest integer evenly divisible by both numbers. For example, the LCM of 9 and 12 is 36. Develop a pseudocode algorithm which will find the LCM of any two given numbers. Translate your algorithm into a java method.
5. A number is said to be a perfect number if it is equal to the sum of its factors other than itself. For instance, the number 28 is a perfect number since $1+2+4+7+14 = 28$. Develop a pseudo algorithm which will test a given number to determine if it is a perfect number. Translate your algorithm into a java method.
6. A number is said to be "balanced" if the largest digit in the number is equal to half the sum of the digits. For example 123 is a "balanced" number; 3 is the largest digit; $(1+2+3)/2=3$. Design and write a java method that will return a boolean value indicating if the number passed as a parameter is balanced.
7. Design and write a java method that reverses the order of the elements in an array that is passed as a parameter. For example, if the array originally contained the values 12 35 21 75 125 5 then it would contain the following after the method was called 5 125 75 21 35 12.
8. Write a java method which concatenates two String objects,
9. Write a java method which concatenates two array objects.
10. Write a method that accepts an integer number and displays all its smallest factors. For example, if the input integer is 120, the output should be as follows: 2, 2, 2, 3, 5,
11. Write a method called MakeChange to produce change from one dollar for any purchase less than one dollar.
The method should display the name (e.g. dime, nickel, etc.) and amount of each coin. It should minimize the number of coins (68 pennies would not be appropriate way to make change for 68 cents). The parameter is the amount of change.
For example, change for a purchase of 58 cents would be 1 quarter, 1 dime, 1 nickel, and 2 pennies.

12. What is the output of the following Java program?

```
public class Demo
{
    public static void main(String[] args)
    {
        byte number;
        int data = 125;

        number = (byte) data;

        System.out.println(" number = " + number);
    }
}
```

13. What is the **hexadecimal** number equivalent of binary number

1010101011010101101 ?

14. Newton's Method – The square root of a number may be found using an algorithm called Newton's method. Successive values of X are produced by the following equations and will converge to the square root of A.

$$X_1 = A/2;$$
$$X_{i+1} = \frac{1}{2}(X_i + A/X_i) \text{ for } i=0,1,2,3,\dots$$