positions later in the alphabet. (If the replacement would go past the letter *Z*, the cipher "wraps around" to the beginning of the alphabet. For example, if each letter is replaced by the letter two positions after it, then *Y* would be replaced by *A*, and *Z* would be replaced by *B*.) Write a program that encrypts a message using a Caesar cipher. The user will enter the message to be encrypted and the shift amount (the number of positions by which letters should be shifted):

```
Enter message to be encrypted: Go ahead, make my day.
Enter shift amount (1-25): 3
Encrypted message: Jr dkhdg, pdnh pb gdb.
```

Notice that the program can decrypt a message if the user enters 26 minus the original key:

```
Enter message to be encrypted: Jr dkhdg, pdnh pb gdb.
Enter shift amount (1-25): 23
Encrypted message: Go ahead, make my day.
```

You may assume that the message does not exceed 80 characters. Characters other than letters should be left unchanged. Lower-case letters remain lower-case when encrypted, and upper-case letters remain upper-case. *Hint:* To handle the wrap-around problem, use the expression `((ch - 'A') + n) % 26 + 'A'` to calculate the encrypted version of an upper-case letter, where `ch` stores the letter and `n` stores the shift amount. (You'll need a similar expression for lower-case letters.)

16. Write a program that tests whether two words are anagrams (permutations of the same letters):

```
Enter first word: smartest
Enter second word: mattress
The words are anagrams.

Enter first word: dumbest
Enter second word: stumble
The words are not anagrams.
```

Write a loop that reads the first word, character by character, using an array of 26 integers to keep track of how many times each letter has been seen. (For example, after the word *smartest* has been read, the array should contain the values 1 0 0 0 1 0 0 0 0 0 0 0 1 0 0 0 0 1 2 2 0 0 0 0 0 0, reflecting the fact that *smartest* contains one *a*, one *e*, one *m*, one *r*, two *s*'s and two *t*'s.) Use another loop to read the second word, except this time decrementing the corresponding array element as each letter is read. Both loops should ignore any characters that aren't letters, and both should treat upper-case letters in the same way as lower-case letters. After the second word has been read, use a third loop to check whether all the elements in the array are zero. If so, the words are anagrams. *Hint:* You may wish to use functions from `<ctype.h>`, such as `isalpha` and `tolower`.

17. Write a program that prints an $n \times n$ magic square (a square arrangement of the numbers $1, 2, \ldots, n^2$ in which the sums of the rows, columns, and diagonals are all the same). The user will specify the value of n:

```
This program creates a magic square of a specified size.
The size must be an odd number between 1 and 99.
Enter size of magic square: 5
   17   24    1    8   15
   23    5    7   14   16
    4    6   13   20   22
   10   12   19   21    3
   11   18   25    2    9
```