

Introduction to C Programming

Task 1 - Exercise in loop and switch/case (linecalc.c)

Write a program that will act as a simple in-line calculator. It should allow you to input a number (and press ENTER), followed by an operator (+, -, *, /), ask for a second number and on pressing ENTER produce the answer.

Draw a flowchart first, this will help you with the logic of the loop required and structure of the switch / case statements. When you have your program working print it out and keep it with your flowchart.

Hints: For the number input variable use a float, for the operator use a char.

Use scanf to collect numeric data and getch to input the operator.

The getch() function is in conio.h so you will need to #include this at the top of your program.

You will need to test the character input against the four operands and then perform the calculation. It may also be advisable to check the second value input for not being a zero as this would cause a divide error. Display a suitable error message if zero is entered.

Your program may run something like this:

```
Set-up variables
Display Message
Get Input (1st number)
Display Message
Get Input (operator)
Display Message
loop back to here
Get Input (2nd number)
If Input is Zero
    display error message
    loop back to get input again
If operator is ?                (consider switch /case)
    perform calculation and store result
Display result
```

The program as it stands only runs once - how would you make the program continue to run until a choice is made to stop it.

Task 2 - Calculating vehicle stopping distances (stopdist.c)

In a previous session you wrote a program that calculated the distance travelled in feet based on the Miles per Hours (MPH) the vehicle was going.

Do not use your previous program except for reference.

Draw a flowchart and from this write a program that for a given speed in MPH calculates the speed in Feet per Second (fps), the number of car lengths this is equal to (based on a cars length of 12 feet). You should also calculate the stopping distance in feet of the speed (MPH) selected.

Your screen dialogue should look something like this:

This program calculates the distance covered in feet per second based on a given MPH.

Enter travelling speed in MPH:

Distance covered at ... MPH is ... feet per second

At the above speed you would travel the equivalent of ... car lengths based on a car being 12ft

At this speed it would take ... feet to stop, this is the same as Car lengths

Printout your program by loading it in to something like Notepad and keep for reference.

Information.

1 mile = 5280 feet

1 hour = 3600 seconds

formula to calculate fps is: $\text{fps} = (5280.0 / 3600.0) * \text{MPH}$

Number of car lengths = $\text{fps} / 12.0$

Stopping distance = $((\text{MPH} / 20.0) + 1.0) * \text{MPH}$

Stopping distance as car lengths = $\text{Stopping distance} / 12.00$

Make all variables floating point data types.

The number of decimal points can be reduced by including the number of positions required in the printf statement with the type identifier, e.g.

```
printf("Distance covered at %0.1f MPH is %0.2f feet per second", MPH, FPS);
```

Test Data

60mph = 88 fps, equals 7.33 car lengths per second and a stopping distance of 240 feet, equal to 20 car lengths.