

## Integer types

1. List the family of integer types in C.
2. Write a program that prompts the user for 3 values:
  - a) Age of car
  - b) Total car mileage
  - c) Mileage this year

The program should output the following information:

```
Total car mileage = ...
Age of car        = ...
Average mileage per year = ...
Average mileage per month = ...
```

3. Integer constants can be expressed in decimal, octal, and hex in C  
Rewrite the following code fragment using

```
    a)      octal notation for the integer constants
    b)      hex  notation for the integer constants

int main(void)
{
    int      eight = 8;
    int      sixteen = 16;
    int      two_fifty_five = 255;

}
```

4. Write a program that takes an integer value from the user and prints it in the following formats: (assume the number 255 was entered)

```
number = 255    decimal
          FF    HEX (UPPER CASE)
          ff    hex (lower case)
          377   octal
```

5. List 3 situations where an unsigned int would be more suitable than a straightforward int... and 3 cases where unsigned ints are not suitable.
6. Write a program that reads the following whole numbers from the user, and then prints the values back again.
  - a) Sun-to-Earth distance (km)
  - b) Portsmouth to Le-Havre distance (km)
  - c) days in a year
  - d) the latitude of Rio-de-Janerio
  - e) capital US defence budget

## Floating point

1. Floating point numbers may be written in 2 forms:

```
123.45      (a number with a decimal point)
1.2345e2     (scientific notation)
```

Express the following floating point constants in scientific notation:

- a) 1980.76
- b) .125
- c) 0.00314
- d) 1990.05
- e) 20000.0

Express the following in "decimal point" notation:

- f) 1.56E3
- g) 1.56E-3
- h) 6.63E-5
- i) 3.2256e2
- j) 1.6e-19

2. Write a program that prompts the user for 2 floating point numbers, and prints the product and the division of the 2 numbers.
3. Write a program that prompts the user for the radius of the Earth (in km), and prints out the volume of earth  
( $= 4 * 3.14 * \text{radius} * \text{radius} * \text{radius} / 3$ )
4. Write a program that asks the user for his (desired!) monthly salary

Enter your desired monthly salary: £\_\_\_\_\_

The user input should overwrite the underscores in the message prompt  
The program should then print the annual salary as shown:

£1200.00 a month is £24000.00 a year

#### Mixed Bunch

1. What are the 4 fundamental data types in C?  
What variations are there on these basic types?
2. Which of the following are invalid identifiers and why?  
3d            o\_no\_o\_no    \_\_yes        00\_go        star\*it  
21\_am\_i    one\_i\_aren't   me\_to-2    xYshouldI   int
3. Choose a reasonable name and data type for each of the following:  
a)        a person's marital status  
b)        the number of people in Hampshire  
c)        the circumference of a Mitre football  
d)        the surface area of the Moon  
e)        the day of the week (0 = Sunday, 1 = Monday etc)  
f)        the number of grains of sand in an egg cup  
g)        the difference between 2 exam marks
4. Using your variables from question 3, write a program that prompts the user to enter a value for each of the values a) to g)  
The program should then print out each value.

You might like to consult your C Notebook, chapter 20 tables 7 and 8 respectively.

5. Each constant value in C has a definite type. Examine the list of compile-time constants below, and note the type of each value. (the first 2 are done for you). Then write a program to determine the number of bytes each constant will occupy.  
HINT: sizeof (...)

- a)        10        = int
- b)        20L       = long int
- c)        300U       =
- d)        400LU       =
- e)        500UL       =
- f)        40000       =
- g)        180000       =
- h)        'a'        =
- i)        '\a'       =
- j)        '\x81'       =
- k)        10.05       =
- l)        10.05F       =
- m)        10.05L       =

6. At the beginning of a car journey the reading on a car's odometer is `start_km` kilometres, and the fuel tank is full. After the journey the reading is `finish_km` and `litres_used` litres of fuel are needed to fill the tank.

Write a program which reads the values of `start_km`, `finish_km` and `litres_used` and outputs the rate of fuel consumption to the nearest integer, followed by the actual rate correct to 2 decimal places.

7. What are the 4 fundamental data types in C?  
What variations are there on these basic types?

8. Of the following are invalid identifiers and why?

<code>3d</code>	<code>o_no_o_no</code>	<code>__yes</code>	<code>00_go</code>	<code>star*it</code>
<code>21_am_i</code>	<code>one_i_aren't</code>	<code>me_to-2</code>	<code>xYshouldI</code>	<code>int</code>

9. Choose a reasonable name and data type for each of the following:

- a) a person's marital status
- b) the number of people in Hampshire
- c) the circumference of a Mitre football
- d) the surface area of the Moon
- e) the day of the week (0 = Sunday, 1 = Monday etc)
- f) the number of grains of sand in an egg cup
- g) the difference between 2 exam marks

10. Using your variables from question 3, write a program that prompts the user to enter a value for each of the values a) to g)  
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11. Each constant value in C has a definite type. Examine the list of compile-time constants below, and note the type of each value.  
(the first 2 are done for you). Then write a program to determine the number of bytes each constant will occupy.  
HINT: `sizeof (...)`

- |    |                     |                         |
|----|---------------------|-------------------------|
| a) | <code>10</code>     | <code>= int</code>      |
| b) | <code>20L</code>    | <code>= long int</code> |
| c) | <code>300U</code>   | <code>=</code>          |
| d) | <code>400LU</code>  | <code>=</code>          |
| e) | <code>500UL</code>  | <code>=</code>          |
| f) | <code>40000</code>  | <code>=</code>          |
| g) | <code>180000</code> | <code>=</code>          |
| h) | <code>'a'</code>    | <code>=</code>          |
| i) | <code>'\a'</code>   | <code>=</code>          |
| j) | <code>'\x81'</code> | <code>=</code>          |
| k) | <code>10.05</code>  | <code>=</code>          |
| l) | <code>10.05F</code> | <code>=</code>          |
| m) | <code>10.05L</code> | <code>=</code>          |

12. At the beginning of a car journey the reading on a car's odometer is `start_km` kilometres, and the fuel tank is full. After the journey the reading is `finish_km` and `litres_used` litres of fuel are needed to fill the tank.

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