# Worksheet 1 Programming Basics Answers

**Task 1**

1. Write an algorithm that will calculate the amount of paint required to paint a room. The user will enter the dimensions of the room, the total unpaintable area (such as windows, doors or brickwork) and the number of coats of paint required. Assume that 1 litre of paint covers 11 sq m.

You can get some handy tips from the site below:

<https://www.dulux.co.uk/en/decorating-tips-and-advice/how-to-calculate-the-right-amount-of-paint>

input dimensions of room and unpaintable area

input the number of coats of paint required

calculate totalArea = height \* (length + width) \* 2

input unpaintedSpaceArea

paintableArea = (totalArea – unpaintedSpaceArea)

input number of coats required

totalPaintArea = paintableArea\* numCoats

litresNeeded = totalPaintArea / 11

print litresNeeded

**Task 2**

2. Rewrite your algorithm using more formal pseudocode.

OUTPUT “Enter height, length and width of room”

height 🡨 USERINPUT

length 🡨 USERINPUT

width 🡨 USERINPUT

OUTPUT “Enter unpainted space area”

unpaintedSpaceArea 🡨 USERINPUT

OUTPUT “Enter number of coats of paint required”

numCoats 🡨 USERINPUT

area 🡨 height \* (length + width) \* 2

paintArea 🡨 (area – unpaintedSpaceArea)

totalPaintArea 🡨 paintArea \* numCoats

litresNeeded 🡨totalPaintArea/11 #assume 11 m2/L

OUTPUT litresNeeded

If possible, code the program and test it.

3. Write pseudocode for a program which calculates the number of miles per gallon a car is doing. The user will input

* the car mileage the last time the car was filled
* the car mileage now
* the total number of litres taken to fill the tank

n.b. There are 0.22 gallons in a litre, or 4.546 litres in a gallon

litresPerGallon 🡨 4.546

previousCarMileage 🡨 USERINPUT

currentCarMileage 🡨 USERINPUT

litresToFillTank 🡨 USERINPUT

totalMiles 🡨 currentCarMileage - previousCarMileage

gallonsToFillTank 🡨 litresToFillTank/litresPerGallon

mileage 🡨 totalMiles/gallonsToFillTank

OUTPUT “Miles per gallon” + mileage

Which of the identifiers in your program could you define as

(i) a constant? (What is the advantage of doing this?)

litresPerGallon. It is easy to read and use the identifier. Defining it as a constant will reduce the chance of accidentally changing the value. (Note that you cannot define a constant in Python.)

(ii) an integer

lastCarMileage, currentCarMileage as it is not necessary to be accurate to fractions of a mile – though you could use real numbers here.

(iii) a real (decimal) number?

litresPerGallon, gallonsToFillTank, litresToFillTank as this is a calculation which will result in fractions of a gallon.

**Task 3**

4. Write an algorithm using pseudocode that asks the user to input the number of students and the number of books to be equally divided between them. Calculate and output the number of books that each student will receive and the number left over.

numberOfStudents 🡨 USERINPUT

numberOfBooks 🡨 USERINPUT

booksPerStudent 🡨 numberOfBooks div numberOfStudents

leftOver 🡨 numberOfBooks mod numberOfStudents

OUTPUT “Books per student: ”, booksPerStudent

OUTPUT “Books left over: ”, leftOver

5. Write pseudocode for an algorithm that prompts the user to enter a name, uses a string function to find its length and then tells the user how long the name is.

name 🡨 USERINPUT

length 🡨 len(name)

OUTPUT “There are: ”, length, “ characters in your name”