

**Worksheet Three**

*"Ford!", Arthur said, "There's an infinite number of monkeys outside who want to talk to us about this script for Hamlet they've worked out".*  
*Douglas Adams, The Hitch Hikers Guide to the Galaxy 1979*

**Unit Learning Outcomes Addressed by this worksheet: 1**

Place the answers to exercise one in a text file called exerciseOne.txt and the answers to exercise two in a text file called exerciseTwo.txt. The text files should be placed in your P03 directory.

**Exercise One**

(a) For each of the indentifiers below:

1. State whether or not it is legal (i.e. will it compile?). If it is not legal than state the reason.
2. State whether or not the name follows the Java naming convention. If it does then state what type of identifier it is (i.e. class, method or variable or constant).

NavigationReading, fred.dat, My\_int, loop-Counter, 2ndcounter, Men&Women, -zero, a, noMore, FISH

- (b) Evaluate the following Java expressions:
- $$5 + 7 + 3 * 12 \% 2 * 3$$
- $$3 + 24 / 5 * 2$$
- $$12 + 5 * 2.0 - 19 \% 10 + 2.0$$

What is the problem with the last expression? How would you fix the problem?

- (c) Give Java assignment statements for each of the following algebraic formulae (remember you can use built in functions)

$$weirdValue = \frac{(zeroToOne * 39.0) + 1.0}{2.6}$$

$$triangleArea = \sqrt{s(s - side1)(s - side2)(s - side3)}$$

$$\text{where } s = \frac{(side1 + side2 + side3)}{2.0}$$

the roots of the quadratic:  $ax^2 + bx + c$

- (d) Why can we be "sure" of integer values and not of real values? Can you think of any examples to illustrate this?

**Exercise Two (Another algorithm with sub modules)**

Design an algorithm which will:

- Input the cost of a product and the amount the customer has tendered for payment. you may assume that the payment is always > cost. You may also assume that the cost and the amount paid are always in increments of 5 cents.
- The algorithm should:
  - Calculate the amount of change required.
  - Determine the notes and coins to be given to the customer.
  - Output both to the user.

A good strategy is to calculate and output the dollar amounts required and then do the same for the cents amounts. Make good use of sub modules and think carefully about your algorithm as it seems straight forward but can be a bit tricky. This one will need to be developed carefully. use an example to work out how you would decide the change as a human and then use that knowledge to attempt your solution.

**Exercise Three (Another Java implementation)**

Convert your pseudo code design into a complete Java application.

**Exercise Four.**

A tiler wishes to calculate the number of tiles required to tile one room in a house and the cost of the tiles. The standard allowance for breakage is 5%. Your tutor will explain a bit about how tilers tile floors.

To design an algorithm which would work for all types of rooms and all types of tiles would be far too complex and impossible for you at this stage of your learning. List a set of constraints which you feel will allow you to simplify the problem.

List out the major steps required in the algorithm. Do not work out detail calculations at this point. Simply work out what the major steps would be and what variables seem to be required. Write the major steps in the form of a main algorithm. Steps which will easily translate into Java (e.g. the INPUT steps) can stay as they are but the steps which require more refinement should be represented as sub Module calls. You will refine your design further in the next worksheet exercise.