**Pseudocode Questions**

1. A countdown timer on a website is created to give a user 60 seconds to enter his or her passcode before it automatically blocks the user from access the site.

The code for the timer is shown below.

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| --- |
| Line 1. SET time to 0  Line 2. REPEAT  Line 3. WAIT 1 seconds  Line 4. SET total\_time to total\_time +1  Line 5. UNTIL total\_time = 60  Line 6. SEND [“Time to enter has now expired”] to DISPLAY |

(a) The program stops when time is equal to 60. The design is changed to include a warning message when the time is more than 45.

Use pseudocode or a programming language you are familiar with to show how this additional feature could be implemented. (3)

(b) This screenshot shows the interface used to enter a user’s passcode.



When the submit button is clicked the highlighted numbers are read into an array called usercode. This has to be matched with the passcode which is stored in an array called passcode.

Write below, using pseudocode or a language you are familiar with, code that would display the message “Unlocked” when the array elements in ‘usercode’ are equal to the equivalent elements in ‘passcode’. (3)

2. Paul is a student and has written a program to record how much he studies each day in the 30 days before his exams start. Each day he enters a value for the total number of hours used for study that day. Each of these values is stored in an array called ‘hours’.

(a) Using pseudocode or a programming language of your choice, write a short program which will tell Paul the average number of hours he studied over the 30 days. (3)

(b) The pseudocode shown below shows how the hours are entered.

|  |
| --- |
| Line 1: REPEAT  Line 2: RECEIVE study\_time FORM keyboard  Line 3: IF study\_time < 0 OR study\_time > 12 THEN  Line 4: SEND error message to display  LINE 5: END IF  LINE 6: UNTIL NOT (study\_time < 0 OR study\_time > 12) |

Describe all of the events that will occur if Paul enters the value 15. (3)

3. A factory is equipped with sensors. These sensors use embedded technology to monitor levels of toxic gas in areas of the factory.

If the temperature in an area is above 20 degrees and the toxic level is above 50 then the vents are opened in that area of factory.

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| --- |
| Line 1: RECEIVE temperature FROM real sensor  Line 2: RECEIVE toxic\_level FROM real sensor  Line 3: RECEIVE factory\_area FROM keyboard  Line 4: IF temperature > 20 OR toxic\_level >50 THEN  Line 5: REPEAT  Line 6: SEND open vents TO vents  Line 7: SEND [ factory\_area & “ has vents open”] to DISPLAY  Line 8: UNTIL temperature > 20  Line 9: END IF |

The pseudocode above shows the design for the program. There are **two** errors in the **logic** of the program. Find and describe each error. (2)

4. Dorothy has just started programming and has created an algorithm to search the array miles which holds 100 numbers. Dorothy wishes to find the largest number in the array and has developed the following algorithm.

|  |
| --- |
| Line  1 SET max\_value TO 0  2 SET counter TO 1  3 REPEAT  4 IF miles[counter] > max\_value THEN  5 SET max\_value TO miles[counter]  6 END IF  7 SET counter TO counter + 1  8 UNTIL counter = 101  9 SEND max\_value TO DISPLAY |

Dorothy could use a variable called **max\_position** as part of this algorithm.

She inserts a line of code after line 2.

|  |
| --- |
| SET max\_position TO 1 |

With reference to the line numbers shown, state additional lines of code Dorothy would add to the program if she wished to use this variable. (2)

5. [Higher Question] A **function** was developed using the following algorithm to determine a council tax band for any house value.

|  |
| --- |
| Line  1 SET taxband TO “-“  2 IF housevalue < 80000 THEN  3 SET taxband TO “E”  4 END IF  5 IF housevalue >= 80000 AND housevalue < 106000 THEN  6 SET taxband TO “F”  7 END IF  8 IF housevalue >= 106000 AND housevalue < 212000 THEN  9 SET taxband TO “G”  10 END IF  11 IF housevalue > 212000 THEN  12 SET taxband TO “H”  13 END IF  14 RETURN taxband |

(a) Explain why this algorithm would return an incorrect *taxband* if the *housevalue* is 212000. (2)

(b) The developer of the function has said that the use of a series of IF statements is inefficient.

Using pseudocode or a language with which you are familiar, rewrite the algorithm to correct the error and make the code more efficient. (3)

(c) Danny works for HomeAdvice and is writing a program to calculate housevalue’s and provide information about council tax bands.

He has downloaded the corrected function, *taxband*, from the development server.

Danny’s program calculates the current *housevalue* by multiplying two variables: *base\_price* and *percentage\_increase* together. The program also stores the value of the taxband in a variable called *band*.

Using pseudocode or a language with which you are familiar, write an algorithm for a subroutine that will:

• Ask the user for the values for variables *base\_price* and *percentage\_increase*.

• Use the function to assign the variable *band*

• Display *band* on screen.

(3)