

End of Unit Quiz – Unit 2.1 Algorithms

1.

- a. How is
- decomposition**
- used when thinking computationally?

- b. A theme park uses a 3D computer simulation of a rollercoaster. Riders must wear a virtual reality headset to experience the ride.

Using examples from this scenario, explain what is meant by **abstraction**.

2.

- ai. The array
- people*
- contains the values:

```
["Imogen", "Fletcher", "Kirstie", "Zoe", "Gavin"]
```

What is the reason why this array could not be searched using a binary search?

- aii. Once the issue identified in part (i) has been resolved, describe the steps that would be taken to search the array for the value "Fletcher" using a binary search.

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- bi. The algorithm below uses a different method to search through the array for a name.

Fill in the gaps to complete the algorithm.

```
array people[5]
people = ["Imogen", "Fletcher", "Kirstie", "Zoe", "Gavin"]
found = False
x = 0
searchfor = input("enter a name to search for : ")
while found = False ..... x <5

if people[x] = searchfor then

    found = .....

    print "found at position" + .....

    x = x + 1

endif
.....
```

- bii. What is the name of this searching algorithm?

- c. A user has a database of 100,000 people and needs to search through to find one particular person.

Compare the efficiency of **both** searching algorithms covered in parts (a) and (b) for a data set of this size.

3.

ai. A programmer has a list of numbers in an array called *scores*, as shown below:

17	9	4	-12	3	39
----	---	---	-----	---	----

When setting up a bubble sort algorithm for these numbers, the programmer uses a variable called *swaps* which can either be True or False.

What is the data type of the variable *swaps*?

aii. How would the programmer use this variable when implementing the bubble sort?

b. One section of the bubble sort algorithm used by the programmer is shown below:

```
if scores[x] > scores [x] + 1 //if scores in wrong order
scores[x] = scores[x+1]
scores[x+1] = scores[x] // swap numbers over
```

What is the error that is contained in the code above? Give a corrected version.

c. How would an insertion sort algorithm arrange the numbers in the *scores* array into order?

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- d. What is the name of one **other** sorting algorithm?

- e. What is one advantage and one disadvantage of using a bubble sort?

4. A school divides students into house groups based on the month that they were born in. Students born in January, February, March or April are put into Numpty House. Students born in May, June, July or August are put into Muchamore House. All other students are put into Twit house.

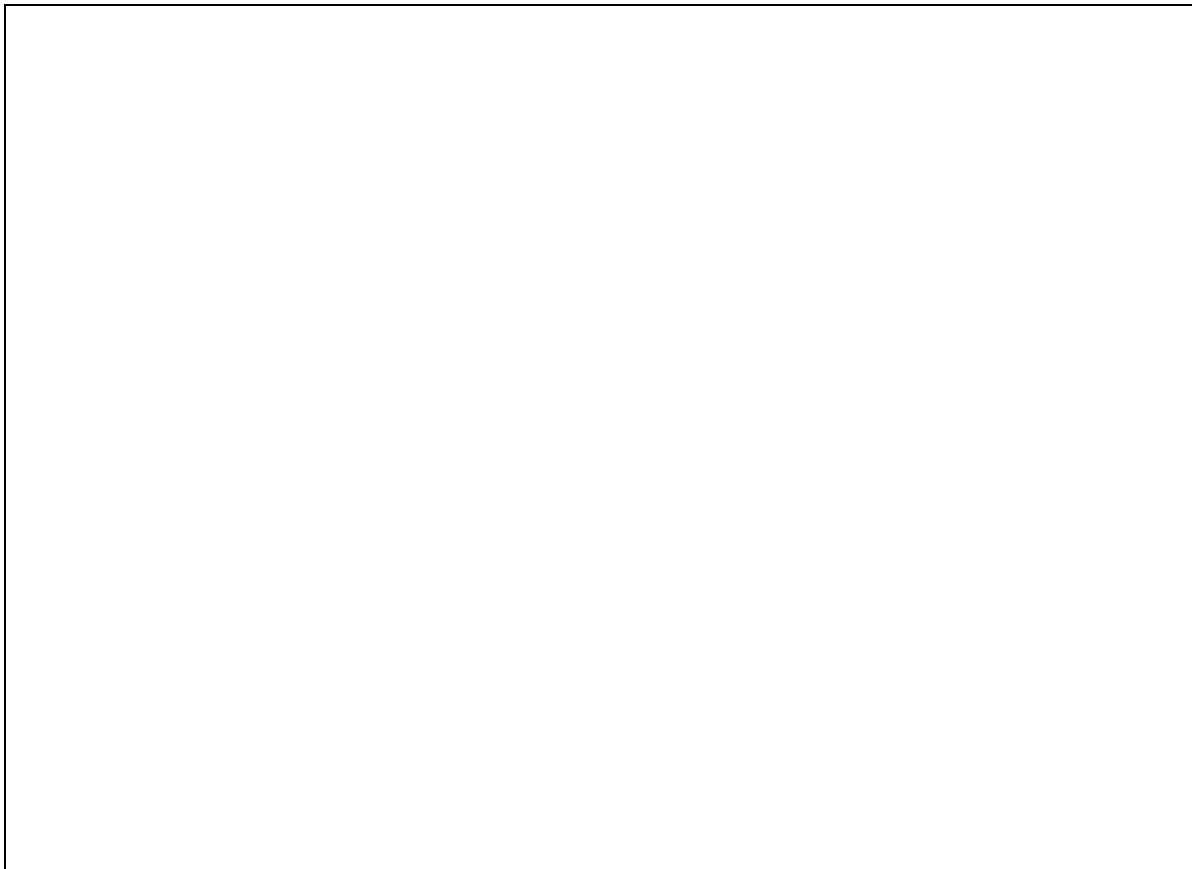
Using **pseudocode**, write an algorithm that will:

- Ask the user to enter a number (1 to 12) relating to their birth month
- Decide which house they are in and print this out.
- Keep a running total of how many students are in each house.
- Repeat the above for 20 students.
- When 20 students have entered their details, print out how many students are in each house.



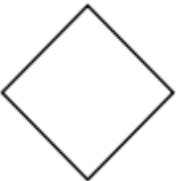

5.

```
num = 7  
for x = 1 to num  
  print x * num  
next
```

Draw a flowchart version of this algorithm.



6. Complete the following table to describe the use of each of the following flow chart symbols.

Symbol	Explanation of use
	
	
	
	

7. A car dealer uses the following algorithm to determine the price to charge for cars.

01 `p = input("purchase price of car")`

02 `i = input("number of improvements made")`

03 `a = input("age of car in years")`

04 `s = p + (i*100)`

05 `if a <= 10 then`

06 `s = s + s`

07 `endif`

```
08 print "sale price is " + s
```

Work out the output value with the following inputs:

ai. $p = 1000, i = 2, a = 12$

aii. $p = 5000, i = 3, a = 10$

aiii. $p = 8000, i = 0, a = 5$

b. rewrite line 06 so that the + operator is **not** used.