

001 An algorithm a day...

Algorithm Question

Write an algorithm which:

- asks the user to input 2 numbers
- outputs the larger of the two numbers along with a suitable message

[5 marks]

Algorithm Example Answer

Write an algorithm which:

- asks the user to input 2 numbers
 - outputs the larger of the two numbers along with a suitable message
- [5 marks]

*****There are always different ways to solve a problem. This algorithm is just an example. What is important is that the logic is correct!*****

LOGIC:

- **A first number is inputted and stored**
- **A second number is inputted and stored**
- **The contents of each variable is cast to an integer type**
- **A comparison is made to see which number is larger**
- **The larger number is outputted...**
- **...along with a suitable message**

EXAMPLE ALGORITHM:

```
num1 = input("Enter a number")
num2 = input("Enter another number")
num1 = int(num1)
num2 = int(num2)
if num1 > num2 then
    print(num1 + "is the largest number")
else
    print(num2 + "is the largest number")
endif
```

002 An algorithm a day...

Algorithm Question

If Monday = 0, Tuesday = 1 etc...

Adapted from OCR GCSE 9-1 Unit 2 Sample Exam

...write an algorithm which:

- Asks the user to enter a number,
- Outputs the day that the number represents,
- Validates the number so that an error message displays if the number is not a valid weekday number.

[5 marks]

Algorithm Example Answer

If Monday = 0, Tuesday = 1 etc...

...write an algorithm which:

- Asks the user to enter a number,
- Outputs the day that the number represents,
- Validates the number so that an error message displays if the number is not a valid weekday number.

[5 marks]

*****There are always different ways to solve a problem. This algorithm is just an example. What is important is that the logic is correct!*****

LOGIC:

- **Value INPUTTED and STORED**
- **Inputted value cast to an integer type**
- **Multiple IF / CASE statements to decide which day based on inputted number AND an OUTPUT statement to display the day to the user**
- **An ELSE / CASE to handle numbers below 0 and above 6 with an error message to inform the user of the invalid entry.**

EXAMPLE ALGORITHM:

```
number = input("Enter a number: ")
number = int(number)
if number == 0 then
    print("Monday")
elseif number == 1 then
    print("Tuesday")
elseif number == 2 then
    print("Wednesday")
elseif number == 3 then
    print("Thursday")
elseif number == 4 then
    print("Friday")
elseif number == 5 then
    print("Saturday")
elseif number == 6 then
    print("Sunday")
else
    print("INVALID NUMBER ENTERED")
endif
```

004 An algorithm a day...

Algorithm Question

Source: OCR GCSE Computing Exam June 2011

A dog that is 5 years old is equivalent to a 42 year old human. You need to write a program that converts the age of a dog to the equivalent age of a human.

Write an algorithm which:

- Asks for the age of the dog in years
- If the age is 2 or less, the human equivalent is 12 times the age
- If the age is more than 2, the human equivalent is 24 for the first 2 years, plus 6 for every additional year.

[5 marks]

Algorithm Example Answer

A dog that is 5 years old is equivalent to a 42 year old human. You need to write a program that converts the age of a dog to the equivalent age of a human.

Write an algorithm which:

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[5 marks]

*****There are always different ways to solve a problem. This algorithm is just an example. What is important is that the logic is correct!*****

LOGIC:

Allows an input for the dog's age

Multiplies age by 12 if age is less than or equal to 2

If age is greater than 2:

Works out how many years over 2

Multiplies the number by 6

Adds 24 (for the first 2 years)

EXAMPLE ALGORITHM:

```
dogs_age = input("Enter your dog's age: ")
dogs_age = int(dogs_age)
if dogs_age <= 2 then
    human_dog_years = dogs_age * 12
else
    extra_years = dogs_age - 2
    human_dog_years = 24 + (extra_years * 6)
endif
```

005 An algorithm a day...

Algorithm Question

Consider the array **numbers** = [2, 5, 3, 6, 2, 3, 6, 4] where the value of numbers[2] is 3.

Write an algorithm which:

- Adds up the numbers in the array
- Displays the result.

To get full marks a loop should be used in your algorithm.

[5 marks]

Algorithm Example Answer

Consider the array **numbers = [2, 5, 3, 6, 2, 3, 6, 4]** where the value of numbers[2] is 3.

Write an algorithm which:

- Adds up the numbers in the array
- Displays the result.

To get full marks a loop should be used in your algorithm.

[5 marks]

*****There are always different ways to solve a problem. This algorithm is just an example. What is important is that the logic is correct!*****

LOGIC:

- **A variable to hold the total (running total) should be declared**
- **A loop should be used which will run for the same number of times as there are items in the array**
- **Inside the loop the next array item should be accessed using the counter as the index...**
- **...and it should be added to the total**
- **At the end of the loop, the total should be outputted to the screen**

EXAMPLE ALGORITHM:

```
total = 0
for counter = 0 to (numbers.length - 1)
    total = total + numbers(counter)
print(total)
```

006 An algorithm a day...

Algorithm Question

Source: OCR GCSE Computing Exam June 2012

A taxi firm charges £3 for the first mile and £2 for every mile after that. If there are 5 or more passengers, an extra 50% is added to the price.

Write an algorithm which calculates the cost of a journey.

The algorithm should:

- Ask the user to enter the number of passengers
- Ask the user to enter the distance (as an integer)
- Calculate the price of the journey
- Output the price on the screen

[7 marks]

Algorithm Example Answer

A taxi firm charges £3 for the first mile and £2 for every mile after that. If there are 5 or more passengers, an extra 50% is added to the price.

Write an algorithm which calculates the cost of a journey.

The algorithm should:

- Ask the user to enter the number of passengers
- Ask the user to enter the distance (as an integer)
- Calculate the price of the journey
- Output the price on the screen

[7 marks]

*****There are always different ways to solve a problem. This algorithm is just an example. What is important is that the logic is correct!*****

LOGIC:

- **Inputs distance and passengers**
- **Checks if distance is greater than 1**
- **If it is, it will calculate cost by adding 3 to the (distance-1) * 2**
- **If it is not, it will set cost as 3**
- **Checks if more than 4 passengers...**
- **... and adds 50% correctly**
- **Outputs cost**

EXAMPLE ALGORITHM:

```
distance = input("Enter a distance: ")
distance = int(distance)
passengers = input("Enter number of passengers: ")
passengers = int(passengers)
if distance > 1 then
    cost = 3 + ((distance - 1) * 2)
else
    cost = 3
if passengers > 4 then
    surcharge = cost / 2
    cost = cost + surcharge
endif
print(cost)
```

007 An algorithm a day...

Algorithm Question

Source: OCR GCSE Computing Exam Jan 2013

In a factory, the wages earned by a worker is either £2 for every teddy bear they have made or £5 for every hour they have worked, whichever is higher.

Write an algorithm which:

- Allows the user to input the number of teddy bears made and the number of hours worked
- Calculates the wages for the number of teddy bears made - Calculates the wages for the number of hours worked - Outputs the larger of the two results.

[6 marks]

Algorithm Example Answer

In a factory, the wages earned by a worker is either £2 for every teddy bear they have made or £5 for every hour they have worked, whichever is higher.

Write an algorithm which:

- Allows the user to input the number of teddy bears made and the number of hours worked
- Calculates the wages for the number of teddy bears made - Calculates the wages for the number of hours worked - Outputs the larger of the two results.

[6 marks]

*****There are always different ways to solve a problem. This algorithm is just an example. What is important is that the logic is correct!*****

LOGIC:

- **Input teddy bears and hours & cast inputs to integer types**
- **2 * number of teddy bears**
- **5 * hours**
- **Comparing the two answers**
- **Outputting the piece rate if it is greater - Outputting the hour rate if it is greater.**

EXAMPLE ALGORITHM:

```
teddyBears = input("Enter number of bears")
hours = input("Enter hours worked")
teddyBears = int(teddyBears)
hours = int(hours)
perTeddyBear = 2 * teddyBears
perHour = 5 * hours
if perTeddyBear > perHour then
    print(perTeddyBear)
else
    print(perHour)
endif
```

008 An algorithm a day...

Algorithm Question

Source: OCR GCSE Computing Exam June 2013

An isosceles triangle is one which has at least two equal length sides.

Write an algorithm which:

- Asks the user to enter the lengths of a triangle
- Works out if the triangle is isosceles
- Outputs a message stating whether the triangle is isosceles or not.

[5 marks]

Algorithm Example Answer

An isosceles triangle is one which has at least two equal length sides.

Write an algorithm which:

- Asks the user to enter the lengths of a triangle
- Works out if the triangle is isosceles
- Outputs a message stating whether the triangle is isosceles or not.

[5 marks]

*****There are always different ways to solve a problem. This algorithm is just an example. What is important is that the logic is correct!*****

LOGIC:

- **Inputting three lengths & cast to integer type**
- **Comparing lengths in pairs**
- **... for all three ways correctly**
- **... outputting "Isosceles" for all valid cases**
- **... outputting "Not Isosceles" for all cases and only in cases where the three lengths are different.**

EXAMPLE ALGORITHM:

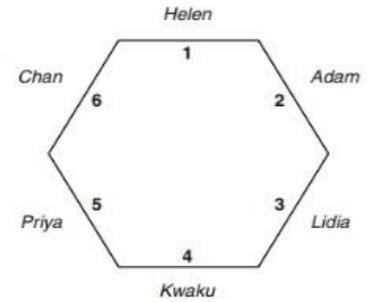
```
length1 = int(input("Enter first length: "))
length2 = int(input("Enter second length: "))
length3 = int(input("Enter third length: "))
if length1 == length2 then
    print("Isosceles")
elseif length1 == length3 then
    print("Isosceles")
elseif length2 == length3 then
    print("Isosceles")
else
    print("Not Isosceles")
endif
```

009 An algorithm a day...

Algorithm Question

Source: OCR GCSE Computing Exam June 2015

A computer game shows 6 players around a table on seats. They are numbered 1 to 6.



The names of the players are stored in an array with 6 elements called `PlayerName`. The index position of the array is used to indicate the seat number. For example, the value of `PlayerName(1)` is 'Helen'.

During the game, each player sometimes moves clockwise by a given number of places.

For example, if the number of places is 2, Helen will move to seat 3, Priya will move to seat 1 etc.

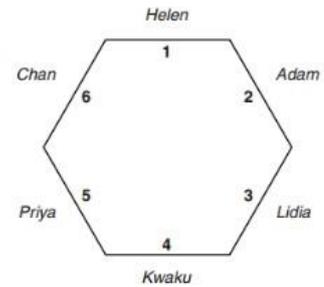
Write an algorithm, which updates the contents of the array 'PlayerMove' after a move has occurred. The algorithm should:

- Allow the number of places to move to be input
- Use iteration
- Ensure that all of the players' names are moved to the correct position in the array.

[6 marks]

Algorithm Example Answer

A computer game shows 6 players around a table on seats. They are numbered 1 to 6.



The names of the players are stored in an array with 6 elements called `PlayerName`. The index position of the array is used to indicate the seat number. For example, the value of `PlayerName(1)` is 'Helen'.

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Write an algorithm, which updates the contents of the array 'PlayerMove' after a move has occurred. The algorithm should:

- Allow the number of places to move to be input
- Use iteration
- Ensure that all of the players' names are moved to the correct position in the array. [6 marks]

*****There are always different ways to solve a problem. This algorithm is just an example. What is important is that the logic is correct!*****

LOGIC:

- **Input the number of places to move (e.g. Num)**
- **Use of temporary variable(s) or second array to**
- **Avoid overwriting values in the array**
- **Sensible use of a loop**
- **... with correct end condition**
- **Correctly deals with moving from position 1 (e.g. 1 + Num) - Correctly deals with moving from position 6 (e.g. Num)**

EXAMPLE ALGORITHM:

```
num = int(input("Enter number: "))
for loop = 1 to num
    temp = playerName[6]
    playerName[6] = playerName[5]
    playerName[5] = playerName[4]
    playerName[4] = playerName[3]
    playerName[3] = playerName[2]
    playerName[2] = playerName[1]
    playerName[1] = temp
next i
```

010 An algorithm a day...

Algorithm Question

Source: OCR GCSE Computing Specimen Exam

A display board can show a flashing message of up to 20 characters.



Write an algorithm which:

- Allows the user to input the message and the number of flashes
- Rejects the message if it is longer than 20 characters and stops
- Otherwise it repeatedly displays the message and clears the display for the correct number of times.

[5 marks]

Algorithm Example Answer

A display board can show a flashing message of up to 20 characters.



Write an algorithm which:

- Allows the user to input the message and the number of flashes
- Rejects the message if it is longer than 20 characters and stops
- Otherwise it repeatedly displays the message and clears the display for the correct number of times.

[5 marks]

*****There are always different ways to solve a problem. This algorithm is just an example. What is important is that the logic is correct!*****

LOGIC:

- **Inputs message and number of flashes**
- **If length of message > 20, output error message and stop**
- **Otherwise run a loop which will**
- **... flash the message**
- **... for the correct number of times**

EXAMPLE ALGORITHM:

```
message = input("Enter your message: ")
numberOfFlashes = int(input("Input number of flashes"))
if message.length > 20 then
    print("This message is too long")
else
    for i = 1 to numberOfFlashes
        print(message)
        sleep(1)
        print("")
        sleep(1)
    next i
endif
```

011 An algorithm a day...

Algorithm Question

Source: OCR GCSE Computing Additional Specimen Exam

You are writing a program that uses an array called WordList. This array contains 10 foreign words in alphabetical order. The contents of the array are shown on the left.

WordList (1)	akesi
WordList(2)	esun
WordList(3)	jaki
WordList(4)	kala
WordList(5)	lipu
WordList(6)	mama
WordList(7)	nasa
WordList(8)	olin
WordList(9)	tasu
WordList(10)	walo

You need to write an algorithm that:

- allows the user to input a word,
- goes through the items in the array WordList in turn, starting from the WordList(1),
- if it finds the word that the user has input, it outputs "Word found".

[5 marks]

Algorithm Example Answer

You are writing a program that uses an array called WordList. This array contains 10 foreign words in alphabetical order. The contents of the array are shown on the left.

WordList (1)	akesi
WordList(2)	esun
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WordList(6)	mama
WordList(7)	nasa
WordList(8)	olin
WordList(9)	tasu
WordList(10)	walo

You need to write an algorithm that:

- allows the user to input a word,
- goes through the items in the array WordList in turn, starting from the WordList(1),
- if it finds the word that the user has input, it outputs "Word found".

[5 marks]

*****There are always different ways to solve a problem. This algorithm is just an example. What is important is that the logic is correct!*****

LOGIC:

- **Input a word**
- **Code contains a loop starting from item 1**
- **... compares the word searched to the current item**
- **... outputs "Word Found" if there is a match**
- **loop stops when you get to item 10 -**

EXAMPLE ALGORITHM:

```
searchWord = input("Enter your word")

for count = 1 to WordList.length
    if WordList[count] == searchWord then
        print("Word Found")
    endif
next count
```