

# Mark Scheme (Results)

# November 2021

Pearson Edexcel International GCSE In Computer Science (4CP0/2B) Paper 02: Application of Computational Thinking

#### **Edexcel and BTEC Qualifications**

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at <u>www.edexcel.com</u> or <u>www.btec.co.uk</u>. Alternatively, you can get in touch with us using the details on our contact us page at <u>www.edexcel.com/contactus</u>.

#### Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: <u>www.pearson.com/uk</u>

November 2021 Question Paper Log Number P69298A Publications Code 4CP0\_2B\_2111\_MS All the material in this publication is copyright © Pearson Education Ltd 2021

#### **General Marking Guidance**

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

### Theory

Question	mp	Answer	Additional Guidance	Mark
1 (a)	A1	Award 1 mark for any of:		
		<ul> <li>Comments (1)</li> <li>Indentation (1)</li> <li>Meaningful variable/constant/subprogram names (1)</li> <li>White space (1)</li> </ul>		(1)

Question	mp	Answer				Additional Guidance	Mark
1 (b)	B1	Award 1 mark for each column:					
	B2						
	B3	Error description	Logic	Syntax	Runtime		
		Divide by 0			$\checkmark$		
		Use x instead of * multiply		✓			
		Subtract 10 from 2 instead of 2 from 10	$\checkmark$				
							(3)

$C_1$			Mark
C1	The only correct answer is D		
	A is not correct because as it is a data structure		
			(1)
		A is not correct because as it is a data structure B is not correct because as there is no arrow looping back to the condition C is not correct because as the flowchart does not include an operator	B is not correct because as there is no arrow looping back to the condition

mp	Answer	Additional Guidance	Mark
B1 B2 B3 B4	<ul> <li>Award up to 4 marks for a linked explanation such as:</li> <li>The list is not sorted (1) Juan should come after Elija if the list was sorted / Elija is compared with Juan (1), so the bottom half of the list would be discarded (1) after the first pass through the loop (1)</li> <li>Binary search works on a sorted list (1) because it uses divide and conquer (1) half the list discarded each pass through (1) based on comparison of search item with middle item (1)</li> </ul>		(4)
mp	Answer	Additional Guidance	Mark
C1 C2 C3 C4 C5	Award 1 mark for each of:         Split into two sets of four (1)         Split each set into two pairs (1)         Split each pair into single elements (1)         Merge elements into sorted pairs (1)         Merge pairs into sorted sets (1)         9       1       7       6       3       5       2       8         9       1       7       6       3       5       2       8         9       1       7       6       3       5       2       8         9       1       7       6       3       5       2       8         9       1       7       6       3       5       2       8         1       9       6       7       3       5       2       8         1       6       7       3       5       2       8	Allow step at C3 to be implied	
	1 2 3 5 6 7 8 9		(5)
	B1 B2 B3 B4 B4 C1 C1 C2 C3 C4	B1 B2 B3 B4       Award up to 4 marks for a linked explanation such as:         B3 B4 <ul> <li>The list is not sorted (1) Juan should come after Elija if the list was sorted / Elija is compared with Juan (1), so the bottom half of the list would be discarded (1) after the first pass through the loop (1)</li> <li>Binary search works on a sorted list (1) because it uses divide and conquer (1) half the list discarded each pass through (1) based on comparison of search item with middle item (1)</li> </ul> mp         Answer           C1 C2 C3 C3 C4 C5         Award 1 mark for each of: Split not two sets of four (1) Split each set into two pairs (1) Split each set into sorted pairs (1) Merge elements into sorted pairs (1) Merge pairs into sorted sets (1)           9         1         7         6         3         5         2         8           9,1,7,6         3,5         2,8         9         1         7         6         3         5         2         8	H       Award up to 4 marks for a linked explanation such as:         Award up to 4 marks for a linked explanation such as:         • The list is not sorted (1) Juan should come after Elija if the list was sorted / Elija is compared with Juan (1), so the bottom half of the list would be discarded (1) after the first pass through the loop (1)         • Binary search works on a sorted list (1) because it uses divide and conquer (1) half the list discarded each pass through (1) based on comparison of search item with middle item (1)         Mp       Answer       Additional Guidance         C1 C2 C3 C3 C4 C5 C3 C5 Split each set into two pairs (1) C5 Split each pair into single elements (1) Merge elements into sorted pairs (1) Merge pairs into sorted sets (1)       Allow step at C3 to be implied         (C1 C3 C4 C5 Split each pair into sorted sets (1)       9 1 7 6 3 5 2 8       Allow step at C3 to be implied         (C1 C5 Split each pairs into sorted sets (1)       9 1 7 6 3 5 2 8       Allow step at C3 to be implied         (C2 C3 C4 C5 Split each pair into sorted sets (1)       9 1 7 6 3 5 2 8       Allow step at C3 to be implied

Question	mp	Answer	Additional Guidance	Mark
3 (a) (i)	A1	C# and Python monthNumber/monthsAndDays/count/found (1) Java monthNumber/monthsAndDays/count/found/input		
				(1)
3 (a) (ii)	A2	monthsAndDays (1)	-	(1)
3 (a) (iii)	A3	C#		
		<ul> <li>WriteLine, ToString, ToInt32, ReadLine</li> </ul>		
		Java		
		<ul> <li>Print, ParseInt, nextLine, ToString, Equals</li> </ul>		
		Python		
		<ul> <li>print/len/int/input (1)</li> </ul>		
				(1)
3 (a) (iv)	A4	Display/showMonthNameAndDays (1)		(1)
3 (a) (v)	A5	pMonth (1)		(1)
3 (a) (vi)	A6 A7	Award 1 mark for each of:		
		Type of test data Test data		
		Boundary (1) 1		
		Erroneous (1) 15		(2)

Question	mp	Answer	Additional Guidance	Mark
3 (b)	B1 B2	Award up to 2 marks for a linked explanation such as:		
		<ul> <li>A library program would not know the names of the calling program's variables in advance (1) meaning it would not be a reusable solution (1)</li> <li>(Using parameters) enables reusable solutions (1) using different data values/arguments (1)</li> <li>Using parameters uses less memory / uses memory more efficiently (1) because it avoids the use of global variables / because the memory is freed after the subprogram is finished (1)</li> </ul>		(2)

Question	mp	Answer	Additional Guidance	Mark
4 (b)	B1 B2	Award up to 2 marks for a linked description such as:		
		• To check to see if a word is the same when it is reversed / is a palindrome (1) and output an appropriate message / repaper is the same when		
		reversed (1)		(2)

### Coding

Question	mp	Answer	Additional Guidance	Mark
1 (d)	Awa	rd 1 mark for each of:		
	D1	= changed to $==$ (1)		
	D2	Condition changed to less than / final two print statements swapped (1)		
	D3	else changed to else (1)		(3)
Code exam	nples			_
C#	if (	number1 == number2)		
	{			
		Console.WriteLine("The numbers are equal");		
	}	if (number 1 ( number 2)		
	erse {	if (number1 < number2)		
		Console.WriteLine("The highest number is " + number2 + " and the low	<pre>vest number is " + number1);</pre>	
	}			
	else			
	{			
Java	11	(number1 == number2)		
	{			
	l.	<pre>System.out.print("Numbers are equal");</pre>		
	}			
	e.	lse if (number1 < number2)		
	í	System.out.print("The highest number is " + number2 + " and the lo	west number is " +number1).	
	}	System.out.print( the highest humber is + humber 2 + and the it	west number is financeri,	
	el	Lse		
Python	10			
гушоп	11 1	numberl == number2: print("Numbers are equal")		
	eli	f number1 < number2:		
		print("The highest number is", number2, "and the lowest number is", n	umberl)	
	else			

Question	mp	Answer	Additional Guidance	Mark
1 (e)	Awa	rd 3 marks for:		
	E1	Prompt for a number to be input (1)		
	E2	Input stored in an integer variable (1)		
	E3	Loop used (1)		
	E4	Loop iterates only for the values 1 – 12 (1)		
	E5	Display is correct when program executes (1)		(5)
Code exam	nples			
C#	Ccc in fc { }	<pre>/ Print prompt and get number from user onsole.Write("Enter the number: "); nt num = Convert.ToInt32(Console.ReadLine()); / Create loop to display the table or (int count = 1; count &lt;= 12; count++) Console.WriteLine(count + " x " + num + " is " + count * num); onsole.ReadLine();</pre>		
Java	5 5 1	<pre>/ Print prompt and get number from user canner input = new Scanner(System.in); ystem.out.print("Enter the number "); nt num = input.nextInt(); / Create loop to display the table or (int count = 1; count &lt;=12; count++) System.out.println(count + " x " + num + " is " + count * num);</pre>		

Question	mp		Additional Guidance	Mark
2 (a)	Awa	rd one mark for each of:	Logic of algorithm must be	
	A1	Input as an integer (1)	followed as set out.	
	A2	Loop with correct conditions start <= end and not found (1)	Alternatives must address each point.	
	A3	Use of correct symbol for integer division (in conversion of DIV) or type coercion (1)	Do not penalise candidates who attempt more than the	
	A4	Check to see if number in middle matches item (1)	stated requirements.	
	A5	Set found to true (1)	Do not penalise spelling	
	A6	Check to see if item is less than number in middle (1)	mistakes in the input message.	
	A7	Set end to middle – 1 (1)		
	A8	else – set start to middle + 1 (1)		
	A9	count incremented by 1 (1)		
	A10	Program execution is fully correct (1)		(10)
Code exam	ples			

```
C#
               Console.WriteLine("What is the number to find? ");
               int item = Convert.ToInt32(Console.ReadLine());
               while (start <= end && !found)</pre>
               {
                   middle = (start + end) / 2;
                   if (numberList[middle] == item)
                    {
                       found = true;
                    }
                   else
                    {
                       if (item < numberList[middle])</pre>
                        {
                           end = middle - 1;
                        }
                        else
                        {
                           start = middle + 1;
                        }
                   count++;
               }
```

```
lava
              Scanner input = new Scanner(System.in);
              System.out.print("What is the number to find? ");
              int item = Integer.parseInt(input.nextLine());
              while (start <= end && !found)</pre>
              {
                 middle = (start + end) / 2;
                 if (numberList[middle] == item)
                  {
                     found = true;
                  }
                  else
                   if (item < numberList[middle])</pre>
                    {
                       end = middle - 1;
                    }
                    else
                       start = middle + 1;
                  count ++;
              }
Python
            item = int(input("What is the number to find? "))
            while start <= end and not found:
                middle = (start + end) // 2
                if numberList[middle] == item:
                     found = True
                 else:
                     if item < numberList[middle]:</pre>
                         end = middle -1
                     else:
                         start = middle + 1
                 count = count + 1
```

Question	mp	Answer	Additional Guidance	Mark
3 (c)	Awa	rd 1 mark for each of:		
	C1	Condition to check whether the year exactly divides by 4 or equivalent condition		
		(1)		
	C2	Condition to check whether year exactly divides by 400 or equivalent condition (1)		
	C3	Condition to check whether year does not exactly divide by 100 or equivalent condition (1)		
	C4	Correct message for at least one of the conditions (1)		
	C5	Program executes and produces the correct output (1)		
	C6	Efficient solution (1)		
				(6)
Code exam	ples			
C#	if (	year % 400 == 0)		
	{	<pre>Console.WriteLine(year + " is a leap year");</pre>		
	}	console.writeLine(year + is a leap year );		
		if (year % 4 == 0 && year % 100 !=0)		
	{	<pre>Console.WriteLine(year + " is a leap year");</pre>		
	}			
	els {	e		
	Į	<pre>Console.WriteLine(year + " is not a leap year");</pre>		
	} // En	d of main program		
Java				
	if (y {	/ear % 400 == 0)		
		<pre>System.out.print(year + " is a leap year");</pre>		
	} else	if (year % 4 == 0 && year % 100 !=0)		
	{	<pre>System.out.print(year + " is a leap year");</pre>		
	} else			
	1	<pre>System.out.print(year + " is not a leap year");</pre>		
	11 5 1			

Python	if year % 400 == 0:
	<pre>print(year,"is a leap year")</pre>
	elif year % 4 == 0 and year % 100 !=0:
	<pre>print(year,"is a lear year")</pre>
	else:
	<pre>print(year,"is not a leap year")</pre>

Question	mp	Answer	Additional Guidance	Mark
4 (a)	Awa	rd one mark for each of:		
		Validation		
	A1	Suitable input prompt and storing it in binaryPattern (1)		
	A2	Length of binary pattern validated as 8 (1)		
	A3	Loop used to check the length of binary pattern (1)		
		Binary to denary		
	A4	Loop through each digit in the binary pattern (1)		
	A5	Correct conversion of at least one binary digit to relevant placeholder (1)		
	A6	Attempt at running total using denaryNumber (1)		
	A7	Correct running total using denaryNumber (1)		
	A8	Print statement includes the binary pattern and the denary number (1)		
	A9	Print statement outside of conversion loop (1)		
	A10	Comment explains how conversion works (1)		
	A11	Program executes correctly for any binary pattern that is exactly 8 characters		
		long only (1)		(11)

```
C#
           while (binaryPattern.Length != 8)
               Console.WriteLine("Enter an 8 digit binary number to convert to denary ");
               binaryPattern = Console.ReadLine();
           }
           foreach (char digit in binaryPattern)
               if (digit == '1')
                   denaryNumber += denaryPlaceholders[count] * 1;
               count++;
           Console.WriteLine(binaryPattern + " converted to denary is " + denaryNumber);
           Console.ReadLine();
           while (binaryPattern.length() != 8)
Java
            {
               Scanner input = new Scanner(System.in);
               System.out.print("Enter an 8 digit binary number to convert to denary ");
                binaryPattern = input.next();
            }
            for (char digit : binaryPattern.toCharArray())
            {
               if (digit == '1')
                   denaryNumber += denaryPlaceholders[count] * 1;
                count ++;
            System.out.print(binaryPattern + " converted to denary is " + denaryNumber);
```

```
      Python
      while len(binaryPattern) != 8:
binaryPattern = input("Enter an 8 digit binary number to convert to denary: ")

      for digit in binaryPattern:
if digit == "1":
denaryNumber = denaryNumber + denaryPlaceholders[count] * 1
count = count + 1

      print(binaryPattern, "converted to denary is", denaryNumber)
```

For Q5, the first 11 marks are for coding that matches requirements of task. The remaining 9 marks should be allocated on a best fit

Question	mp	Answer	Additional Guidance	Mark
5	A1	At least three variables initialised appropriately		(1)
	A2	Word input		(1)
	A3	Program repeats until 1 is input		(1)
	A4	Loop through each word in the array		(1)
		Words that begin with the same letter		
	A5	Check to see if the first letter of the input word matches the first letter of at least		
		one word in the array		(1)
	A6	The number of words that begin with the same letter displayed		(1)
		Words that contain the input word		
	A7	Check to see if the word contains the input word		(1)
	A8	Number of letters in the word calculated		(1)
	A9	At least one word from the array that contains the input word displayed		(1)
	A10	The number of words that contain the input word displayed		(1)
	A11	Identification of the longest word or the shortest word		(1)

Band 1 (1-3 marks)	Band 2 (4-6 marks)	Band 3 (7-9 marks)	Mark
Little attempt to decompose into	Some attempt to decompose into	The problem has been decomposed into	
component parts	component parts	component parts	
Some parts of the logic are clear and	Most parts of the logic are clear and	The logic is clear and appropriate to the	
appropriate to the problem	mostly appropriate to the problem	problem	
Some appropriate use and manipulation	The use and manipulation of data types,	The use and manipulation of data types,	
of data types, variables, data structures	variables and data structures and	variables and data structures and	
and program constructs	program constructs is mostly appropriate	program constructs is appropriate	
Parts of the code are clear and readable	Code is mostly clear and readable	Code is clear and readable	
Finished program will not be flexible	Finished program will function with some	Finished program could be used with	
enough with other data sets or input	but not all other data sets or input	other data sets or input	
The program meets some of the given	The program meets most of the given	The program fully meets the given	
requirements	requirements	requirements	(9)

Code e	xamples	
C#	14	// Add your code here
	15	<pre>string inputWord = "";</pre>
	16	
	17	<pre>while (inputWord != "1")</pre>
	18	{
	19	<pre>int shortest = 5000;</pre>
	20	<pre>int longest = 0;</pre>
	21	<pre>String shortestWord = "";</pre>
	22	<pre>String longestWord = "";</pre>
	23	
	24	Console.WriteLine("Enter a word or 1 to exit ");
	25	<pre>inputWord = Console.ReadLine();</pre>
	26	
	27	if (inputWord != "1")
	28	
	29	<pre>int count = 0;</pre>
	30	
	31	foreach (String word in wordArray)
	32	
	33	if(word[0] == inputWord[0])
	34	
	35	Console.WriteLine(word);
	36	count ++;
	37	
	38	} // End of Loop
	39	
	40	<pre>Console.WriteLine(count + " word(s) beginning with "+ inputWord[0]);</pre>
	41	Console.WriteLine("");
	42	
	43	count = 0;
	44	
	45	foreach (String word in wordArray)
	46	
	47	if(word.Contains(inputWord))
	48	
	49	count ++;
	50	Console.WriteLine(word);
	51	
	52	<pre>int length = word.Length;</pre>
	53	
	54	if (longest < length)

55		
55		
56	<pre>longest = length;</pre>	
57	<pre>longestWord = word;</pre>	
58	}	
59		
60	<pre>if (shortest &gt; length)</pre>	
61		
62	<pre>shortest = length;</pre>	
63	<pre>shortestWord = word;</pre>	
64	}	
65	}// end of checking word	
66	} // End of for loop	
67		
68	// Print the number of words, the number of characters in the longest and	
69	// shortest word, the longest and the shortest word	
70		
71	if (count > 0)	
72	{	
73	<pre>Console.WriteLine(count + " word(s) with "+ inputWord + " in them");</pre>	
74	<pre>Console.WriteLine("The longest word has " + longest + " characters");</pre>	
75	<pre>Console.WriteLine("The shortest word has " + shortest + " characters");</pre>	
76	<pre>Console.WriteLine("The longest word is " + longestWord + " characters");</pre>	
77	<pre>Console.WriteLine("The shortest word is " + shortestWord + " characters");</pre>	
78	Console.WriteLine("");	
79	}	
80	else	
81	{	
82	Console.WriteLine("There were 0 words that had all the letters from " + inputWord + " in them");	
83	Console.WriteLine("");	
84	} // End of printing words	
85	} // End of check	
86	} // End of while loop	

	13	// Add your code here	
Java	14	<pre>Scanner input = new Scanner(System.in);</pre>	
	15	String inputWord = "";	
	16		
	17	// While there is a word run the program	
	18 🗸	<pre>while (!inputWord.equals("1")) {</pre>	
	19		
	20	<pre>int shortest = 5000;</pre>	
	21	<pre>int longest = 0;</pre>	
	22	String shortestWord = "";	
	23	String longestWord = "";	
	24	Set ing tongestation - )	
	25	<pre>System.out.println("Enter a word or 1 to exit ");</pre>	
	26	System.out.println("");	
	27	<pre>inputWord = input.nextLine();</pre>	
	28 ~	if (!inputWord.equals("1")){	
1	29	// Find words that begin with the same letter as the input word	
	30	int count = 0;	
	31	in court = 0,	
	32	// Get each word in the array	
	33 ~	for (String word: wordArray){	
	34	Tor (String Word: WordArray){	
	35	// If the first character of the word is the same as the first character of	
	36 37 ~	<pre>// the input word then print the word if (used should should</pre>	
	38	<pre>if (word.charAt(0) == inputWord.charAt(0)){     Surder out printle(uprd));</pre>	
	39	<pre>System.out.println(word); count ++;</pre>	
	40	Courte ++,	
	40	} // End of for Loop	
	41	3 // End of for coop	
	42	// Drink the total number of words that herein with the same latter	
	43	<pre>// Print the total number of words that begin with the same letter System.out.println(count + " word(s) beginning with "+ inputWord.charAt(0));</pre>	
	45	System.out.println("");	
	46		
	40	// Find words that contain the input word	
	48	count = 0;	
	48	court = 0,	
	50	// Get each word in the array	
	51 ~	for (String word: wordArray){	
	52		
	53 V	<pre>// Check to see if the word contains the inputWord if (word contains/inputWord)){</pre>	
		<pre>if (word.contains(inputWord)){     count this </pre>	
	54	count ++;	
	55	<pre>System.out.println(word);</pre>	
	56	11 Oct the least of the used	
	57	// Set the length of the word	
	58	<pre>int length = word.length();</pre>	

<pre>62 63 64 65 66 66 66 67 7 67 66 66 67 7 7 7 6 68 6 6 6 6</pre>	61 V	<pre>if (longest &lt; length) {     lengett = length; }</pre>	
64       }         65       // If the length is shorter than the shortest replace it and the shortestWord         66       // If the length is shorter than the shortest replace it and the shortestWord         67       if (shortest > length);         68       shortest = length;         69       j         70       j         71       }// End of checking word         72       }// Find of for loop         73       // Print the number of words, the number of characters in the longest and         74       // Print the number of words, the number of characters in the longest and         75       // System.out.println(count + " word(s) with "+ inputWord + " in them");         78       System.out.println("The longest word has " + shortest + " characters");         79       System.out.println("The shortest word is " + longestWord + " characters");         79       System.out.println("The longest word is " + longestWord + " characters");         79       System.out.println("The shortest word is " + shortestWord + " characters");         79       System.out.println("The shortest word is " + shortestWord + " characters");         71       System.out.println("The shortest word is " + shortestWord + " characters");         72       System.out.println("The wore 0 words that had all the letters from " + inputWord + " in them");         73			
<pre>// If the length is shorter than the shortest replace it and the shortestWord if (shortest &gt; length){ shortest = length; shortestWord = word; }// End of checking word } // Find of checking word } // Fint the number of words, the number of characters in the longest and // Print the number of words, the number of characters in the longest and // shortest word, the longest and the shortest word if( count &gt; 0{ System.out.println(count + " word(s) with "+ inputWord + " in them"); System.out.println("The longest word has " + longest + " characters"); System.out.println("The shortest word has " + longestWord + " characters"); System.out.println("The shortest word has " + longestWord + " characters"); System.out.println("The shortest word is " + longestWord + " characters"); System.out.println("The shortest word is " + shortestWord + " characters"); System.out.println("The shortest word is " + shortestWord + " characters"); System.out.println("The shortest word is " + shortestWord + " characters"); System.out.println("The shortest word is " + shortestWord + " characters"); System.out.println("The shortest word is " + shortestWord + " characters"); System.out.println("The shortest word is " + shortestWord + " characters"); System.out.println("The shortest word is " + shortestWord + " characters"); System.out.println("The shortest word is " + shortestWord + " characters"); System.out.println("There were 0 words that had all the letters from " + inputWord + " in them"); System.out.println("There were 0 words that had all the letters from " + inputWord + " in them"); System.out.println(" Shortest Word S</pre>		longestwora = wora;	
66       // If the length is shorter than the shortest replace it and the shortestWord         67       if (shortest > length){         68       shortest = length;         69       }         70       }         71       }// End of checking word         72       }// End of for loop         73       // Print the number of words, the number of characters in the longest and         75       // Print the number of words, the number of characters in the longest and         76       if( count > 0){         77       System.out.println(count + " word(s) with "+ inputWord + " in them");         78       System.out.println("The longest word has " + longest + " characters");         79       System.out.println("The shortest word is " + shortest + " characters");         79       System.out.println("The shortest word is " + shortest + " characters");         79       System.out.println("The shortest word is " + shortest + " characters");         79       System.out.println("The shortest word is " + shortest + " characters");         79       System.out.println("The shortest word is " + shortest + " characters");         79       System.out.println("The shortest word is " + shortest + " characters");         70       System.out.println("The shortest word is " + shortest + " characters");         71       System.out.println("The were 0		J	
67        if (shortest > length){         68       shortest = length;         69       shortestWord = word;         70       }         71       }         72       }         73       // End of checking word         74       // Print the number of words, the number of characters in the longest and         75       // Shortest word, the longest and the shortest word         76       if( court > 0){         77       System.out.println("The longest word has " + longest+ " characters");         78       System.out.println("The longest word has " + shortest " characters");         79       System.out.println("The longest word is " + longestWord + " characters");         79       System.out.println("The shortest word is " + longestWord + " characters");         79       System.out.println("The shortest word is " + shortestWord + " characters");         71       System.out.println("The shortest word is " + shortestWord + " characters");         71       System.out.println("The words that had all the letters from " + inputWord + " in them");         72       System.out.println("There were 0 words that had all the letters from " + inputWord + " in them");         73       System.out.println("There were 0 words that had all the letters from " + inputWord + " in them");         73       // End of printing words <t< td=""><td></td><td>() If the length is charten the chartest perfect it and the chartest/land</td><td></td></t<>		() If the length is charten the chartest perfect it and the chartest/land	
68       ishortest = length;         69       ishortestWord = word;         70       }         71       }         72       }         73       // End of checking word         74       // Print the number of words, the number of characters in the longest and         75       // System.out.println(count + " word(s) with "+ inputWord + " in them");         76       if( count > 0){         77       System.out.println("The longest word has " + longest + " characters");         78       System.out.println("The longest word has " + longest + " characters");         78       System.out.println("The longest word has " + longestWord + " characters");         79       System.out.println("The longest word is " + longestWord + " characters");         80       System.out.println("The shortest word is " + shortestWord + " characters");         81       System.out.println("The shortest word is " + shortestWord + " characters");         82       System.out.println("The were 0 words that had all the letters from " + inputWord + " in them");         83        System.out.println("There were 0 words that had all the letters from " + inputWord + " in them");         84       System.out.println("There were 0 words that had all the letters from " + inputWord + " in them");         85       System.out.println("Therewere 0 words that had all the letters from " + inputWord + " in t			
69       shortestWord = word;         70       }         71       }         72       }         73       }         74       // Print the number of words, the number of characters in the longest and         75       // Print the number of words, the number of characters in the longest and         76       if( count > 0){         77       System.out.println(count + " word(s) with "+ inputWord + " in them");         78       System.out.println("The longest word has " + shortest + " characters");         79       System.out.println("The longest word has " + shortest + " characters");         80       System.out.println("The longest word is " + shortest + " characters");         81       System.out.println("The shortest word is " + shortestWord + " characters");         82       System.out.println("The shortest word is " + shortestWord + " characters");         83       System.out.println("The shortest word is " + shortestWord + " characters");         83       System.out.println("There were 0 words that had all the letters from " + inputWord + " in them");         84       System.out.println("			
<pre>70 } // End of checking word 71 } // End of checking word 72 } // End of for Loop 73 74 // Print the number of words, the number of characters in the Longest and 75 // shortest word, the Longest and the shortest word 76 if( court &gt; 0){ 77 if( court &gt; 0){ 78 System.out.println("The longest word has " + longest + " characters"); 79 System.out.println("The longest word has " + shortest + " characters"); 79 System.out.println("The longest word is " + longestWord + " characters"); 80 System.out.println("The longest word is " + longestWord + " characters"); 81 System.out.println("The shortest word is " + shortestWord + " characters"); 82 System.out.println("The shortest word is " + shortestWord + " characters"); 83 \</pre>			
<pre>71 } // End of checking word 72 } // End of checking word 73  74 // Print the number of words, the number of characters in the longest and 75 // Shortest word, the longest and the shortest word 76 // shortest word, the longest and the shortest word 76 // shortest word, the longest and the shortest word 77 system.out.println(count + " word(s) with "+ inputWord + " in them"); 78 System.out.println("The longest word has " + longest + " characters"); 79 System.out.println("The longest word is " + longestWord + " characters"); 80 System.out.println("The longest word is " + shortest + " characters"); 81 System.out.println("The shortest word is " + shortestWord + " characters"); 82 System.out.println("The shortest word is " + shortestWord + " characters"); 83 // else { 84 System.out.println("There were 0 words that had all the letters from " + inputWord + " in them"); 85 System.out.println("</pre>			
<pre>72 } // End of for loop 73 74 // Print the number of words, the number of characters in the longest and 75 // shortest word, the longest and the shortest word 76 v if( count &gt; 0){ 77 System.out.println(count + " word(s) with "+ inputWord + " in them"); 78 System.out.println("The longest word has " + longest + " characters"); 79 System.out.println("The longest word has " + shortest + " characters"); 80 System.out.println("The longest word has " + longestWord + " characters"); 81 System.out.println("The shortest word is " + shortest +" characters"); 82 System.out.println("The shortest word is " + shortestWord + " characters"); 83 v } else { 84 System.out.println("There were 0 words that had all the letters from " + inputWord + " in them"); 85 System.out.println(""); 86 } // End of printing words 87 }</pre>		} // End of checking word	
<pre>73 74 74 75 75 76 77 76 77 76 77 78 77 78 79 79 79 79 79 79 79 79 79 79 79 79 70 70 70 70 70 70 70 70 70 70 70 70 70</pre>			
<pre>74 // Print the number of words, the number of characters in the longest and 75 // shortest word, the longest and the shortest word 76 v if( count &gt; 0){ 77 // System.out.println(count + " word(s) with "+ inputWord + " in them"); 78 // System.out.println("The longest word has " + longest + " characters"); 79 // System.out.println("The longest word has " + shortest + " characters"); 80 // System.out.println("The shortest word is " + longestWord + " characters"); 81 // System.out.println("The shortest word is " + shortestWord + " characters"); 82 // System.out.println("The shortest word is " + shortestWord + " characters"); 83 v // } else { 84 // System.out.println("There were 0 words that had all the letters from " + inputWord + " in them"); 85 // End of println(""); 86 // } // End of printing words</pre>		) // End () for coop	
<pre>75 // shortest word, the longest and the shortest word 76 \circ if( count &gt; 0){ 77 78 78 79 79 79 79 79 79 79 79 79 79</pre>		// Print the number of words, the number of characters in the Longest and	
<pre>76 v if( count &gt; 0){ 77 78 78 79 79 79 79 79 79 79 79 79 79 79 79 79</pre>	75		
<pre>77 System.out.println(count + " word(s) with "+ inputWord + " in them"); 78 System.out.println("The longest word has " + longest + " characters"); 79 System.out.println("The shortest word is " + shortest + " characters"); 80 System.out.println("The longest word is " + longestWord + " characters"); 81 System.out.println("The shortest word is " + shortestWord + " characters"); 82 System.out.println("The shortest word is " + shortestWord + " characters"); 83 V } else { 84 System.out.println("There were 0 words that had all the letters from " + inputWord + " in them"); 85 System.out.println(""); 86 }// End of printing words</pre>	76 🗸		
78       System.out.println("The longest word has " + longest + " characters");         79       System.out.println("The shortest word has " + shortest + " characters");         80       System.out.println("The longest word is " + longestWord + " characters");         81       System.out.println("The shortest word is " + shortestWord + " characters");         82       System.out.println("The shortest word is " + shortestWord + " characters");         83       System.out.println("The word is " + shortestWord + " characters");         84       System.out.println("There were 0 words that had all the letters from " + inputWord + " in them");         85       System.out.println("");         86       } // End of printing words         87       }	77		
79       System.out.println("The shortest word has " + shortest + " characters");         80       System.out.println("The longest word is " + longestWord + " characters");         81       System.out.println("The shortest word is " + shortestWord + " characters");         82       System.out.println("The shortest word is " + shortestWord + " characters");         83       }         84       System.out.println("There were 0 words that had all the letters from " + inputWord + " in them");         85       System.out.println("");         86       } // End of printing words         87       }	78		
<pre>81 System.out.println("The shortest word is " + shortestWord + " characters"); 82 System.out.println(""); 83</pre>	79		
<pre>82 System.out.println(""); 83 \vee { 84 System.out.println("There were 0 words that had all the letters from " + inputWord + " in them"); 85 System.out.println(""); 86 }// End of printing words 87 }</pre>	80	<pre>System.out.println("The longest word is " + longestWord + " characters");</pre>	
83      } else {       84     System.out.println("There were 0 words that had all the letters from " + inputWord + " in them");       85     System.out.println("");       86     } // End of printing words       87     }	81	<pre>System.out.println("The shortest word is " + shortestWord + " characters");</pre>	
84     System.out.println("There were 0 words that had all the letters from " + inputWord + " in them");       85     System.out.println("");       86     } // End of printing words       87     }	82	System.out.println("");	
85         System.out.println("");           86         } // End of printing words           87         }	83 🗸	} else {	
86     } // End of printing words       87     }	84	<pre>System.out.println("There were 0 words that had all the letters from " + inputWord + " in them");</pre>	
87 }	85	System.out.println("");	
	86	} // End of printing words	
88 } // End of while loop	87	}	
	88	} // End of while loop	

	13 #	While there is a word run the program
Python		hile inputWord !="1":
	15	
	16	shortest = 5000
	17	longest = 0
	18	shortestWord = ""
	19	longestWord = ""
	20	
	21	<pre>inputWord = input("Enter a word or 1 to exit: ")</pre>
	22	print("")
	23	
	24 🗸	if inputWord !="1":
	25	# Find words that begin with the same letter as the input word
	26	count = 0
	27	# Get each word in the array
	28 🗸	for word in wordArray:
	29	# If the first character of the word is the same as the first character of
	30	# the input word then print the word
	31 🗸	if word[0] == inputWord[0]:
	32	print(word)
	33	count = count + 1
	34	
	35	# Print the total number of words that begin with the same letter
	36	<pre>print("\n",count,"word(s) beginning with",inputWord[0])</pre>
	37	print("")
	38	
	39	# Find words that contain the input word
	40	count = 0
	41	# Get each word in the array
	42 🗸	for word in wordArray:
	43	# Check to see if the word contains the inputWord
	44 🗸	if inputWord in word:
	45	count = count + 1
	46	print(word)
	47	# Set the length of the word
	48	<pre>length = len(word)</pre>
	49	# If the length is langer than the summent langest real ace it and the langest land
	50	# If the length is longer than the current longest replace it and the longestWord
	51 ~ 52	if longest < length
	52	longest = length
	53	longestWord = word
	55	# If the length is shorter than the shortest replace it and the shortestWord
	55 56 ~	if shortest > length:
	50 ~	shortest = length
	58	shortestWord = word
	20	Shor CCSCWOLU - WOLU

50	
59	
60	# Print the number of words, the number of characters in the longest and
61	# shortest word, the longest and the shortest word
62 🗸	if count > 0:
63	<pre>print("\n",count,"word(s) with",inputWord,"in them")</pre>
64	<pre>print("The longest word has", longest, "letters")</pre>
65	<pre>print("The shortest word has", shortest, "letters")</pre>
66	<pre>print("The longest word is",longestWord)</pre>
67	<pre>print("The shortest word is", shortestWord)</pre>
68	print("")
69 🗸	else:
70	<pre>print("There were 0 words with all the letters from",inputWord,"in them")</pre>
71	#
72	
73 # End	I the program when there are no more words
74 print	:("End of program")

Pearson Education Limited. Registered company number 872828 with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom