Candidate surname

Other names

Centre Number

Candidate Number

Pearson Edexcel
International GCSE (9–1)

5–7 June 2019

Time: 3 hours

Paper Reference **4CP0/02**

Computer Science

Paper 2: Application of Computational Thinking

You must have: A computer workstation with an appropriate programming language code editing software and tools, including a code interpreter/compiler, CODES folder containing code and data files, pseudocode command set (enclosed)

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions **requiring a written answer** in the spaces provided
  – *there may be more space than you need.*
- Only **one** programming language (Python, C# and Java) must be used throughout the test.
- Carry out practical tasks on the computer system and save new or amended code using the name given in the question with the appropriate file extension.
- Do **not** overwrite the original code and data files provided to you.
- You must **not** use the internet during the test.

Information

- The total mark for this paper is 80.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question*.
- This paper covers Python, C# and Java.
- The CODES folder in your user area includes all the code and data files you need.
- The invigilator will tell you where to store your work.

Advice

- Read each question carefully before you start to answer it.
- Save your work regularly.
- Check your answers if you have time at the end.

Turn over ▶

Pearson

Answer **all** questions.

Answer the questions **requiring a written answer** in the spaces provided.

Some questions must be answered with a cross in a box ⊠. If you change your mind about an answer, put a line through the box ⊠ and then mark your new answer with a cross ⊠.

Carry out practical tasks on the computer system and save new or amended code using the name given with the appropriate file extension.

Use only ONE programming language throughout the examination.

Indicate the programming language that you are using with a cross in a box ⊠.

| C# | ⊠ | | Java | ⊠ | | Python | ⊠ |

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1 Computer programs use several different programming constructs.

(a) Identify the **most appropriate** data type for the value 4.5

(1)

- ⊠ **A** Boolean
- ⊠ **B** Character
- ⊠ **C** Real
- ⊠ **D** String

(b) Give a definition of a logic error.

(1)

....

....

(c) Open **Q01c** in the code editor.

The program should print out a counter and the counter with 7 added to it.

There are **three** errors in the code.

Amend the code to correct the errors.

Save your amended code as **Q01cFINISHED** with the correct file extension for the programming language.

(3)

(d) Give **one** reason why computer programmers should use comments in their programs.

(1)

....

....

(e) Describe the difference between a local variable and a global variable in a computer program.

(2)

....

....

....

....

(f) Trevor is the manager of a shoe shop.

Sales assistants can earn a bonus based on the numbers of pairs of shoes they sell and the total income for the shop each day.

Open **Q01f** in the code editor.

Amend the code to complete the 'if statement' used to produce the outputs described in the table.

Condition	Output
Shop income is more than £5000 or sales assistant has sold at least 10 pairs of shoes	Bonus is 10% of salary
Shop income is £2000 or more and sales assistant has sold at least 5 pairs of shoes	Bonus is 5% of salary

Do not add any further functionality.

Save your amended code as **Q01fFINISHED** with the correct file extension for the programming language.

(4)

(g) Car registration codes consist of seven characters.

The characters are two upper case letters followed by two numbers and then three upper case letters.

YH62KLV, EY09VPB and CK53PRJ are valid codes.

All codes need to be validated.

Complete the table to show **two** additional validation tests.

For each test give **one** example of erroneous data. The example that you give should fail **only** that test.

(4)

Validation test	Erroneous data
Is it 7 characters?	AB12CD

(Total for Question 1 = 16 marks)

2 Anna has a 5-year-old daughter, Beatrice, and a 14-year-old son, Graham.

(a) Anna wants to program a guessing game for Beatrice to play on the computer.

The program will generate a random number between 1 and 10.

Beatrice has to guess the number.

This pseudocode contains the logic required to create the game.

```
 1    #       Initialise variables
 2            SET counter TO 1
 3            SET answer TO RANDOM(9) + 1     # i.e. a random integer 1 to 10 inclusive
 4            SET guess TO 0
 5
 6    #       Print prompt and take guess from user
 7            SEND "Enter a number from 1 to 10: " TO DISPLAY
 8            RECEIVE guess FROM (INTEGER) KEYBOARD
 9
10    #       Create while loop to check guess
11            WHILE guess <> answer DO
12                    SET counter TO counter + 1
13                    IF guess > answer THEN
14                            SEND (guess & " was too high. Try again.") TO DISPLAY
15                    ELSE
16                            SEND (guess & " was too low. Try again.") TO DISPLAY
17                    END IF
18                    SEND "Guess again: " TO DISPLAY
19                    RECEIVE guess FROM (INTEGER) KEYBOARD
20            END WHILE
21
22    #       Report the correct answer to the user and display the number of guesses
23            SEND ("You guessed " & guess & " in " & counter & "guesses.") TO DISPLAY
```

Write a program to implement the logic in the pseudocode.

Open **Q02a** in the code editor**.**

You **must** use the structure give in **Q02a** to write the program.

Do not add any further functionality.

Save your code as **Q02aFINISHED** with the correct file extension for the programming language.

(10)

(b) Anna has written a program to help Graham with calculations for his science lessons.

Open **Q02b** in the code editor.

Use the code to answer these questions.

(i) State the value of **distance** when the program finishes.

(1)

....

....

(ii) Give **one** reason why there are brackets around **newSpeed + initialSpeed**

(1)

....

....

(iii) State the data type for the variable **distance**.

Justify your answer.

(2)

Data type

....

Justification

....

....

(iv) State the value of **distance** when **acceleration** is 2.75

(1)

....

....

P61881RA0616

(c) Anna has written a program that manipulates text.

Open **Q02c** in the code editor.

Use the code to answer these questions.

(i) Identify a line number where the code includes a relational operator.

(1)

....

(ii) Identify a line number where a variable is set to a numeric value entered by a user.

(1)

....

(iii) Identify the name of a variable passed from the main program to the subprogram.

(1)

....

....

(iv) Identify the name of a variable that receives the value calculated by the subprogram.

(1)

....

....

(v) State the value returned by the subprogram when the input values are **educational**, **3**, **6**

(2)

....

....

....

....

(vi) State the purpose of the subprogram.

(2)

....

....

....

....

(Total for Question 2 = 23 marks)

3 Different algorithms can be used to manipulate data.

(a) **Email.txt** contains a list of email addresses.

Open **Q03a** in the code editor.

Write a program to implement these requirements.

The code must:

- check each email address to ensure it contains the '@' symbol.

- write email addresses that do not contain the '@' symbol to an **Error.txt** file.

You must use the structure given in the file **Q03a** to complete the program.

Do not add further functionality.

Save your code as **Q03aFINISHED** with the correct file extension for the programming language.

(6)

(b) Explain **one** drawback of using the merge sort algorithm to sort large data sets.

(2)

....

....

....

....

(c) Open **Q03c** in the code editor.

Write a program to display the square and cube of a number between 1 and 50 entered by a user.

The code must:

- ask the user to enter a number between 1 and 50 inclusive

- display the number, the square of the number and the cube of the number, with appropriate labels

- stop when a number outside the range 1 to 50 is entered.

Save your code as **Q03cFINISHED** with the correct file extension for the programming language.

(6)

(Total for Question 3 = 14 marks)

4 Encryption is used to encode data.

(a) Identify the word that describes a Pigpen cipher.

(1)

☒ **A** Plaintext

☒ **B** Random

☒ **C** Shift

☒ **D** Substitution
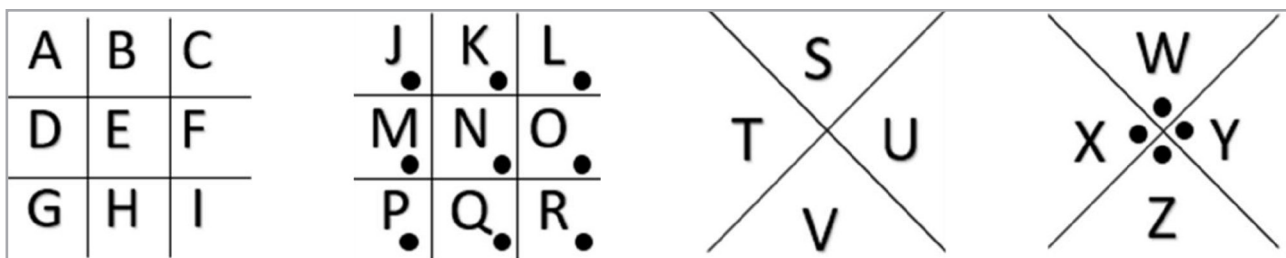
(b) **Figure 1** shows a Pigpen cipher grid.

(3)

A	B	C		J	K	L			S			W	
D	E	F		M	N	O		T		U	X		Y
G	H	I		P	Q	R			V			Z	

Figure 1

Complete the table to decode the symbols using the grid in **Figure 1**.

Symbol	Letter

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA
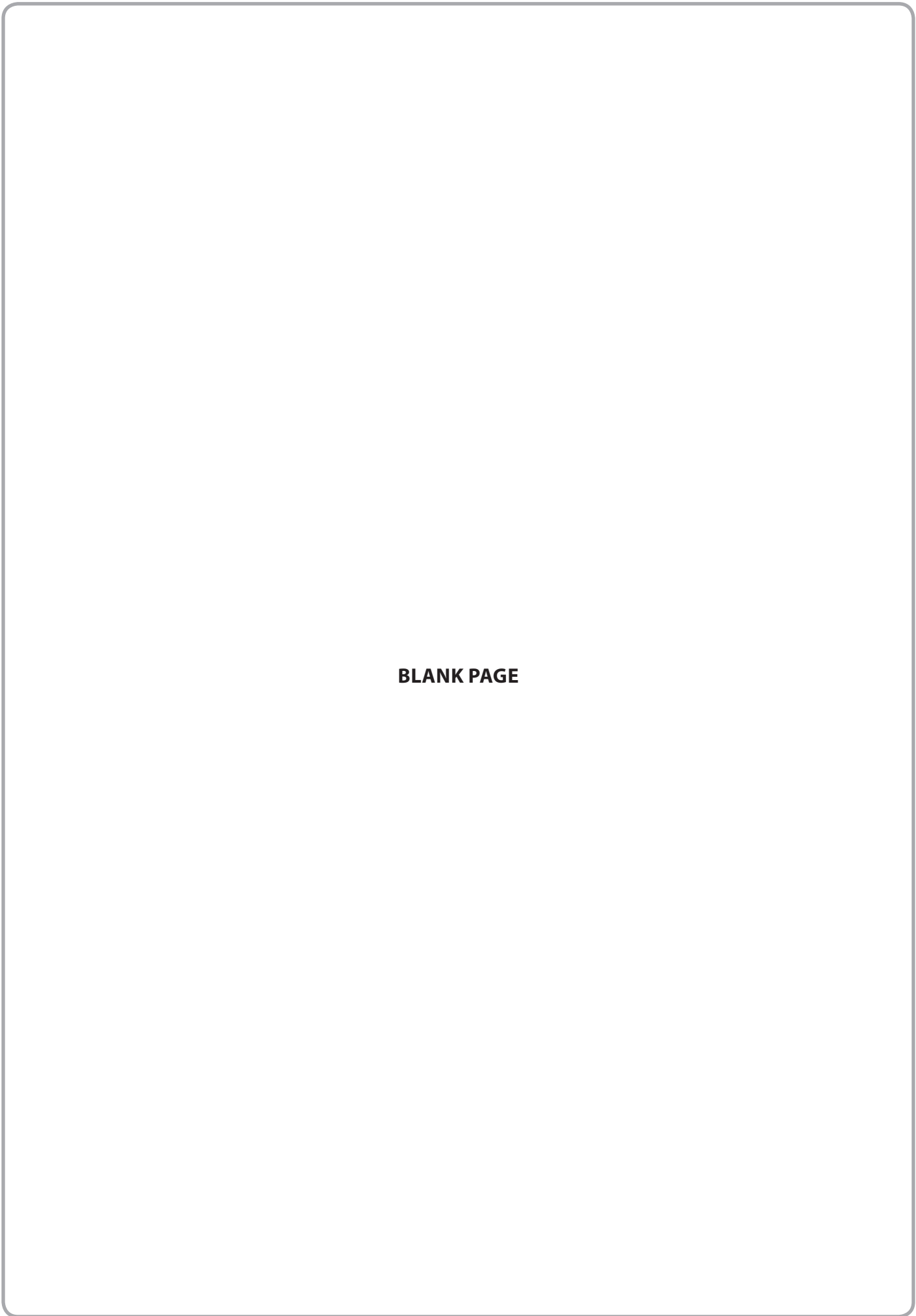
DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(c) **Figure 2** shows another grid.

Figure 2

State whether this set of symbols meets the requirements of a Pigpen cipher.

Justify your answer.

(3)

State

....

Justification

....

....

....

....

(Total for Question 4 = 7 marks)

5 Ria is a school librarian.

She wants a program to analyse pupil use of the library.

She wants to encourage reading by awarding gold, silver and bronze medals to the three pupils who have read the most books.

Test data has been included in the code.

Open **Q05** in the code editor.

Write a program to calculate and display:

- the total number and average number of books pupils have read

- the IDs of pupils who have read fewer than ten books

- the details of the gold, silver and bronze medal winners.

Your program should function correctly even if the number of pupils in the file is changed.

Save your code as **Q05FINISHED** with the correct file extension for the programming language.

(20)

You may use this space for planning / design work.

(Total for Question 5 = 20 marks)

TOTAL FOR PAPER = 80 MARKS

BLANK PAGE

FOR EXAMINER USE

2a	
	1
	2
	3
	4
	5
	6
	7
	8
	9
	10

1a	1	
1b	1	
1c	1	
	2	
	3	
1d	1	
1e	1	
	2	
1f	1	
	2	
	3	
	4	
1g	1	
	2	
	3	
	4	

2bi	1	
2bii	1	
2biii	1	
	2	
2biv	1	
2ci	1	
2cii	1	
2ciii	1	
2civ	1	
2cv	1	
	2	
2cvi	1	
	2	

3a	1	
	2	
	3	
	4	
	5	
	6	
3b	1	
	2	
3c	1	
	2	
	3	
	4	
	5	
	6	

4a	1	
4b	1	
	2	
	3	
4c	1	
	2	
	3	

5		Points marked
	1	
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
	11	

5		Levels marked
	1	
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	

Q1	16	

Q2	23	

Q3	14	

Q4	7	

Q5	20	

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