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Candidate surname					Other names				
Centre Number					Candidate Number				

Pearson Edexcel International GCSE (9–1)

Monday 1 June – Wednesday 3 June 2026

Time 3 hours

Paper reference **4CP0/2C**

Computer Science (Java)

PAPER 2: Application of Computational Thinking

You must have: A computer workstation with appropriate programming language code editing software and tools, including a code interpreter/compiler, CODES folder containing code and data files, and 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 Java must be used throughout the examination.
- 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 examination.

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 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.

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Answer all questions.

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

Some questions must be answered with a cross ☒. 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 Java throughout the examination.

1 Programmers write code to solve problems.

(a) A program asks the user to enter a decimal value.

(i) Identify the **most appropriate** data type for storing a decimal value.

(1)

- ☐ A Boolean
- ☐ B Integer
- ☐ C Real
- ☐ D String

(ii) Input data values must be between 1.5 and 2.5

Complete the table to show the type of test for **each** value.

The first row has been completed for you.

(2)

Type of test	Value
Boundary	1.5
	2.0
	0.5



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(b) A program calculates body mass index (BMI).

Open **Q01b** in the code editor.

Use the code to answer these questions.

(i) Give the line number where a logical operator is used.

(1)

(ii) Give the name of an integer variable.

(1)

(iii) Give the text of a comment.

(1)

(iv) Give the line number where iteration begins.

(1)

(v) Give the line number where arithmetic operators are used.

(1)



P 8 3 9 7 3 A 0 3 2 0

(c) A program helps athletes monitor their weekly exercise.

Athletes enter their level and the total minutes of exercise for each day.

Elite athletes should exercise for at least 300 minutes per week and club athletes for at least 200 minutes.

The program calculates total minutes of exercise per week and outputs an appropriate message.

Figure 1 shows the output from a working program.

```
Please enter e (elite) or c (club) >e
Please enter total minutes exercise on Monday >50
Please enter total minutes exercise on Tuesday >30
Please enter total minutes exercise on Wednesday >0
Please enter total minutes exercise on Thursday >60
Please enter total minutes exercise on Friday >0
Please enter total minutes exercise on Saturday >60
Please enter total minutes exercise on Sunday >25
Weekly exercise: 225 minutes
You have not met your exercise target of 300 minutes.
```

Figure 1

Open **Q01c** in the code editor.

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

Amend the code to correct the errors.

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

(4)

(Total for Question 1 = 12 marks)



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2 Programs can process data input by users.

- (a) **Figure 2** shows the pseudocode for an algorithm used to process numbers entered by the user.

1	RECEIVE number FROM (INTEGER) KEYBOARD
2	
3	WHILE number > 0 DO
4	IF number >= 90 THEN
5	SET outMessage TO 'Too Big'
6	ELSE
7	IF number >= 30 THEN
8	SET outMessage TO 'Just Right'
9	ELSE
10	IF number MOD 2 = 0 THEN
11	SET outMessage TO 'Low Evens'
12	ELSE
13	SET outMessage TO 'Low Odds'
14	END IF
15	END IF
16	END IF
17	SEND outMessage TO DISPLAY
18	RECEIVE number FROM (INTEGER) KEYBOARD
19	END WHILE
20	
21	SET outMessage TO 'End'
22	SEND outMessage TO DISPLAY

Figure 2

Complete the table to show the output for **each** of the given inputs.

(3)

Input	Output
80	
-2	
16	



(b) Identify the programming construct used on **line 4** of the pseudocode.

(1)

- ☐ **A** Encryption
- ☐ **B** Function
- ☐ **C** Repetition
- ☐ **D** Selection

(c) The algorithm is coded in a high-level language.

Explain what happens when a user enters **TEN** instead of **10**

(2)

(d) Describe the purpose of the modulus operator.

(2)



(e) A program calculates the volume of a cylinder, as shown in **Figure 3**.

The user enters the radius and height.

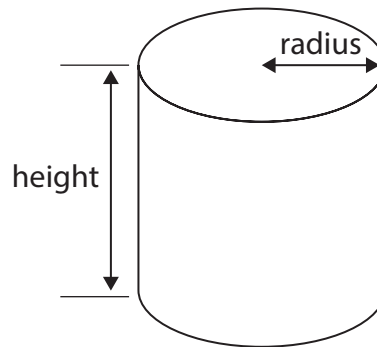


Figure 3

The formula to calculate the volume of a cylinder is:

$$\text{volume} = \pi \times \text{radius}^2 \times \text{height}$$

Figure 4 shows the output from a working program.

```
Enter cylinder radius in cm: 12
Enter cylinder height in cm: 100
Cylinder volume: 45239cm3
```

Figure 4

Open **Q02e** in the code editor.

Amend the code to produce the intended output.

You must use the variables given in the code file.

Do not add any further functionality.

Save your code as **Q02eFINISHED** with the correct file extension for the programming language.

(4)

(Total for Question 2 = 12 marks)



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3 Algorithms are written to solve problems.

(a) A bank pays 4.5% interest on savings.

The bank wants a program to show customers the predicted value of their savings each year.

Customers enter how much money they will deposit and the period (in years) they will save for.

The program calculates and displays:

- the value of the savings account at the end of each year
- the total amount of money earned at the end of the period.

Figure 5 shows an algorithm for the program.

11	RECEIVE deposit FROM (REAL) KEYBOARD
12	RECEIVE period FROM (INTEGER) KEYBOARD
13	
14	SET value TO deposit
15	
16	WHILE period > 0 DO
17	SET value TO value + value * INTEREST
18	SET year TO year + 1
19	SET period TO period - 1
20	SEND ("Year", year, "Savings value: £", (INTEGER) value) TO DISPLAY
21	END WHILE
22	
23	SET earned TO value - deposit
24	SEND ("Total earned: £", (INTEGER) earned) TO DISPLAY

Figure 5

Figure 6 shows test data for a fully functional program.

Deposit	Period	Output
£ 500	5	Year 1 Savings value: £ 522 Year 2 Savings value: £ 546 Year 3 Savings value: £ 570 Year 4 Savings value: £ 596 Year 5 Savings value: £ 623 Total earned: £ 123

Figure 6



Open **Q03a** in the code editor.

Write the code to implement the algorithm given in **Figure 5**.

You must use the variables given in the code file.

Do not add any further functionality.

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

(7)

(b) Programs use constants and variables to store data.

(i) Give **two** characteristics of a constant.

(2)

1

2

(ii) Describe **one** difference between local and global variables.

(2)

(Total for Question 3 = 11 marks)

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4 Programs can store values that have different data types.

(a) Identify the structure that can store multiple values with different data types.

(1)

- ☐ **A** Library
- ☐ **B** Parameter
- ☐ **C** Record
- ☐ **D** String

(b) A program logs hours of sunshine each day for a month.

State the **most appropriate** data structure for storing the sunshine data.

Justify your answer.

(2)

Data structure

Justification

(c) Programmers should write code that is easy to read.

Explain **one** way that subprograms improve the readability of code.

(2)



(d) A program is needed to add numbers to the Fibonacci sequence.

The Fibonacci sequence starts with 0 followed by 1

Each new number is the sum of the previous two numbers, e.g. $0 + 1 = 1$, $1 + 1 = 2$, $1 + 2 = 3$, $2 + 3 = 5$ and so on.

Figure 7 shows part of the Fibonacci sequence.

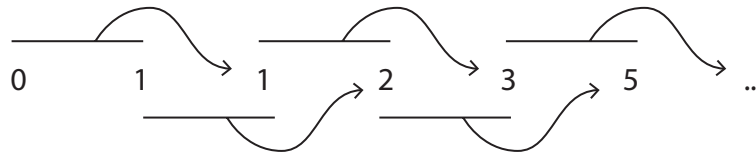


Figure 7

The program must:

- display the last two numbers in the given Fibonacci sequence
- calculate the next number in the sequence
- ask the user to input the next number
- if the input is correct:
 - display a suitable message
 - update the last two numbers
 - update the number of correct user inputs
- if the input is incorrect:
 - display a suitable message with the number of correct user inputs
 - finish the program.



Figure 8 shows part of the output from a working program.

```
Last two numbers in the sequence are 0 and 1
Enter the next number in the sequence: 1
Correct

Last two numbers in the sequence are 1 and 1
Enter the next number in the sequence: 2
Correct

Last two numbers in the sequence are 1 and 2
Enter the next number in the sequence: 4
Incorrect. Numbers you added to sequence: 2
```

Figure 8

Open **Q04d** in the code editor.

Write the program.

You must use the variables given in the code file.

Do not add any further functionality.

Save your code as **Q04dFINISHED** with the correct file extension for the programming language.

(6)

(Total for Question 4 = 11 marks)

5 Programs can sort and search sets of data.

(a) **Figure 9** shows a list of words.

Autumn	Sunset	Forest	Ocean	Marble	Jasmine	Crystal
--------	--------	--------	-------	--------	---------	---------

Figure 9

State the maximum number of comparisons necessary for a linear search algorithm to find a target word in this list.

(1)

(b) Complete the table to show the order in which numbers will be compared, using a binary search algorithm, to find **5017**

Write the number 1 by the first number compared, 2 by the second to be compared, and so on.

(4)

Number	Order compared
2328	
3369	
3928	
4091	
5017	
5909	
6266	
6499	
7148	
7789	
8027	
8412	
9027	
9031	
9256	

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(c) A robot can move in four directions; north (N), south (S), east (E) and west (W).

A string holds the instructions for controlling the robot's movement.

A program is needed to compress the instruction string.

The compressed string will store direction characters, followed by the number of consecutive occurrences.

For example, the instruction string **NNNENN** will be compressed to **N3E1N2**

The program will write the compressed string to a file called **instructions.txt**

The message **Instruction file has been created** will be displayed.

Figure 10 shows the **instructions.txt** file from a working program.

N3W4S5E3N1W9S4W5S4W1N7E3

Figure 10

Open **Q05c** in the code editor.

Write the program.

You must use the variables and structure given in the code file.

Do not add any further functionality.

Save your code as **Q05cFINISHED** with the correct file extension for the programming language.

(9)

(Total for Question 5 = 14 marks)



6 A card game, based on computer specifications, is being programmed.

Each card has three categories: Storage, Cores and RAM.

Figure 11 shows an example of the cards.

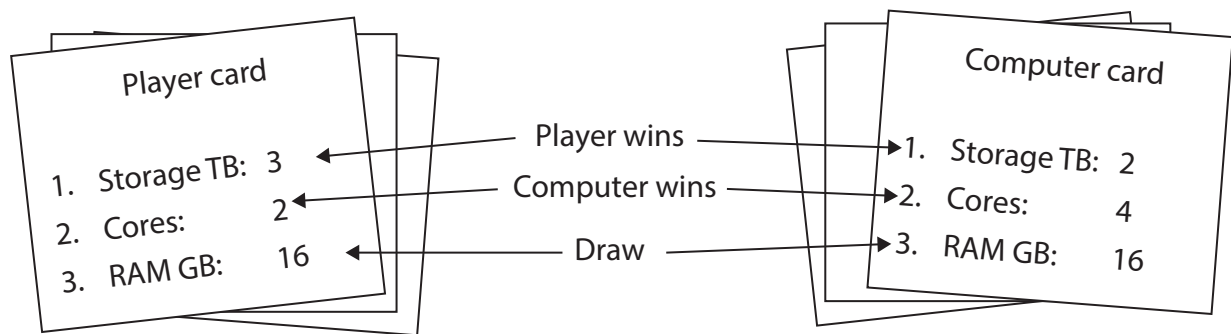


Figure 11

The user gets half the pack and the computer gets the other half.

All cards in the pack must be played.

To play, the player is shown the next card in their hand and chooses a category.

The chosen category on the player card is compared to the value on the computer's card. The highest value wins 1 point. There are no points for a draw.

The program outputs the final scores when all cards have been played.

Figure 12 shows the output from the last round in a functioning program.

```

Your card:
Storage TB: 4
Cores: 6
RAM GB: 16
Please enter 1 for Storage, 2 for Cores or 3 for RAM
>3

Computer card:
Storage TB: 3
Cores: 4
RAM GB: 8

You win!

Final score:
Player 3 - 1 Computer
  
```

Figure 12

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The program code file contains a two-dimensional array representing a pack of cards.

The categories in the pack array are in the order: Storage, Cores and RAM.

The program has these requirements:

- Dealing:
 - half the cards are dealt to the user, the other half to the computer
 - each card is used once only
- Playing:
 - the player's next card is displayed
 - the player inputs their choice of category
 - the program must validate player input to only accept values 1, 2 or 3
 - the computer's next card is then displayed
 - the program compares the selected category to decide the winner of each round
 - 1 point is added to the winner's score. No points are awarded for a draw
- Outputs:
 - the result of each round is displayed (win, lose or draw)
 - the final scores are displayed when all cards have been played.

Open **Q06** in the code editor.

Write the program.

The program should work for any size of pack. Packs have an even number of cards.

You should use the data structure given in the code file.

Use techniques to make your code easy to read.

Save your amended code as **Q06FINISHED** with the correct file extension for the programming language.

(Total for Question 6 = 20 marks)

TOTAL FOR PAPER = 80 MARKS



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Paper
reference

4CP0/2C

Computer Science (Java)

Component 2

Pseudocode command set

Resource Booklet

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Pseudocode command set

Questions in the written examination that involve code will use this pseudocode for clarity and consistency. However, students may answer questions using any valid method.

Data types

INTEGER

REAL

BOOLEAN

CHARACTER

Type coercion

Type coercion is automatic if indicated by context. For example $3 + 8.25 = 11.25$ (integer + real = real)

Mixed mode arithmetic is coerced like this:

	INTEGER	REAL
INTEGER	INTEGER	REAL
REAL	REAL	REAL

Coercion can be made explicit. For example, RECEIVE age FROM (INTEGER) KEYBOARD assumes that the input from the keyboard is interpreted as an INTEGER, not a STRING.

Constants

The value of constants can only ever be set once. They are identified by the keyword CONST. Two examples of using a constant are shown.

CONST REAL PI

SET PI TO 3.14159

SET circumference TO radius * PI * 2

Data structures

ARRAY

STRING

Indices start at zero (0) for all data structures.

All data structures have an append operator, indicated by &.

Using & with a STRING and a non-STRING will coerce to STRING. For example, SEND 'Fred' & age TO DISPLAY, will display a single STRING of 'Fred18'.

Identifiers

Identifiers are sequences of letters, digits and '_', starting with a letter, for example: MyValue, myValue, My_Value, Counter2

Functions

LENGTH()

For data structures consisting of an array or string.

RANDOM(n)

This generates a random number from 0 to n.

Comments

Comments are indicated by the # symbol, followed by any text.

A comment can be on a line by itself or at the end of a line.

Devices

Use of KEYBOARD and DISPLAY are suitable for input and output.

Additional devices may be required, but their function will be obvious from the context. For example, CARD_READER and MOTOR are two such devices.

Notes

In the following pseudocode, the < > indicates where expressions or values need to be supplied. The < > symbols are not part of the pseudocode.

Variables and arrays

Syntax	Explanation of syntax	Example
SET Variable TO <value>	Assigns a value to a variable.	SET Counter TO 0 SET MyString TO 'Hello world'
SET Variable TO <expression>	Computes the value of an expression and assigns to a variable.	SET Sum TO Score + 10 SET Size to LENGTH(Word)
SET Array[index] TO <value>	Assigns a value to an element of a one-dimensional array.	SET ArrayClass[1] TO 'Ann' SET ArrayMarks[3] TO 56
SET Array TO [<value>, ...]	Initialises a one-dimensional array with a set of values.	SET ArrayValues TO [1, 2, 3, 4, 5]
SET Array [RowIndex, ColumnIndex] TO <value>	Assigns a value to an element of a two-dimensional array.	SET ArrayClassMarks[2,4] TO 92

Selection

Syntax	Explanation of syntax	Example
IF <expression> THEN <command> END IF	If <expression> is true then command is executed.	IF Answer = 10 THEN SET Score TO Score + 1 END IF
IF <expression> THEN <command> ELSE <command> END IF	If <expression> is true then first <command> is executed, otherwise second <command> is executed.	IF Answer = 'correct' THEN SEND 'Well done' TO DISPLAY ELSE SEND 'Try again' TO DISPLAY END IF

Repetition		
Syntax	Explanation of syntax	Example
WHILE <condition> DO <command> END WHILE	Pre-conditioned loop. Executes <command> whilst <condition> is true.	WHILE Flag = 0 DO SEND 'All well' TO DISPLAY END WHILE
REPEAT <command> UNTIL <expression>	Post-conditioned loop. Executes <command> until <condition> is true. The loop must execute at least once.	REPEAT SET Go TO Go + 1 UNTIL Go = 10
REPEAT <expression> TIMES <command> END REPEAT	Count controlled loop. The number of times <command> is executed is determined by the expression.	REPEAT 100-Number TIMES SEND '*' TO DISPLAY END REPEAT
FOR <id> FROM <expression> TO <expression> DO <command> END FOR	Count controlled loop. Executes <command> a fixed number of times.	FOR Index FROM 1 TO 10 DO SEND ArrayNumbers[Index] TO DISPLAY END FOR
FOR <id> FROM <expression> TO <expression> STEP <expression> DO <command> END FOR	Count controlled loop using a step.	FOR Index FROM 1 TO 500 STEP 25 DO SEND Index TO DISPLAY END FOR
FOR EACH <id> FROM <expression> DO <command> END FOREACH	Count controlled loop. Executes for each element of an array.	SET WordsArray TO ['The', 'Sky', 'is', 'grey'] SET Sentence to "" FOR EACH Word FROM WordsArray DO SET Sentence TO Sentence & Word & "" END FOREACH

Input/output

Syntax	Explanation of syntax	Example
SEND <expression> TO DISPLAY	Sends output to the screen.	SEND 'Have a good day.' TO DISPLAY
RECEIVE <identifier> FROM (type) <device>	Reads input of specified type.	RECEIVE Name FROM (STRING) KEYBOARD RECEIVE LengthOfJourney FROM (INTEGER) CARD_READER RECEIVE YesNo FROM (CHARACTER) CARD_READER

File handling

Syntax	Explanation of syntax	Example
READ <File> <record>	Reads in a record from a <file> and assigns to a <variable>. Each READ statement reads a record from the file.	READ MyFile.doc Record
WRITE <File> <record>	Writes a record to a file. Each WRITE statement writes a record to the file.	WRITE MyFile.doc Answer1, Answer2, 'xyz 01'

Subprograms

Syntax	Explanation of syntax	Example
PROCEDURE <id> (<parameter>, ...) BEGIN PROCEDURE <command> END PROCEDURE	Defines a procedure.	PROCEDURE CalculateAverage (Mark1, Mark2, Mark3) BEGIN PROCEDURE SET Avg to (Mark1 + Mark2 + Mark3)/3 END PROCEDURE
FUNCTION <id> (<parameter>, ...) BEGIN FUNCTION <command> RETURN <expression> END FUNCTION	Defines a function.	FUNCTION AddMarks (Mark1, Mark2, Mark3) BEGIN FUNCTION SET Total to (Mark1 + Mark2 + Mark3)/3 RETURN Total END FUNCTION
<id> (<parameter>, ...)	Calls a procedure or a function.	Add (FirstMark, SecondMark)



Arithmetic operators	
Symbol	Description
+	Add
–	Subtract
/	Divide
*	Multiply
^	Exponent
MOD	Modulo
DIV	Integer division

Relational operators	
Symbol	Description
=	equal to
<>	not equal to
>	greater than
>=	greater than or equal to
<	less than
<=	less than or equal to

Logical operators	
Symbol	Description
AND	Returns true if both conditions are true.
OR	Returns true if any of the conditions are true.
NOT	Reverses the outcome of the expression; true becomes false, false becomes true.

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