KIND POSITIVE YOURSELF

Nat 5 Computing Science

Revision Questions Booklet

KIND POSITIVE YOURSELF

SOFTWARE DESIGN & DEVELOPMENT

Development Methodologies

SQP Q2 Explain why it may be necessary to return to the implementation stage of an iterative development process after the testing stage. **(1)**

Analysis

SQP Q16a Pam is creating an application that will find and display a person's tax rate based on their salary.

Salary	Tax rate
0–12000	0
12001–40000	20
40001 upwards	40

Analyse the problem and identify the input, the process and the output. **(3)**

Input _____

Process _____

Output _____

2018 Q19a A program is being designed that will allow pupils to add money to their lunch money account. The user enters their name, an 8 character password and the amount of money they want to add. A button is then clicked and the updated balance of the account is displayed.

Analyse the problem and identify all inputs, processes and outputs. **(3)**

Input _____

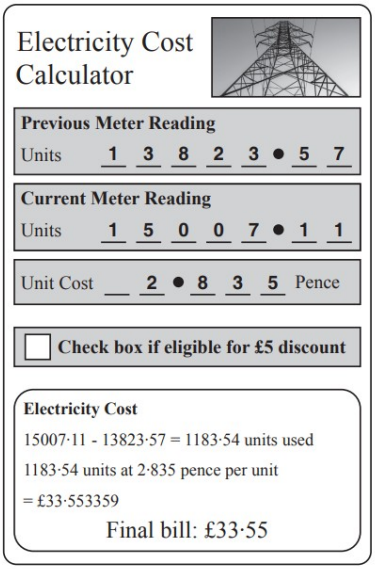
Process _____

Output _____

2019 Q13a A smart phone app is needed to calculate the cost of electricity. The following information will be entered by the user.

- Previous meter reading
- Current meter reading
- Unit cost
- Discount eligibility

A possible user interface for the app is shown below.



Describe two processes that will be carried out by the program. **(2)**

Design

SQP Q19a+b Read the following design for a solution to a problem.

Algorithm

1 Ask the user to enter their name

2 Ask the user to enter their flight details

3 Generate the holiday booking reference

4 Display the holiday booking reference

Refinements

1.1 Ask user to enter surname only

2.1 Ask user to enter first three letters of departure airport (for example: Edi for Edinburgh)

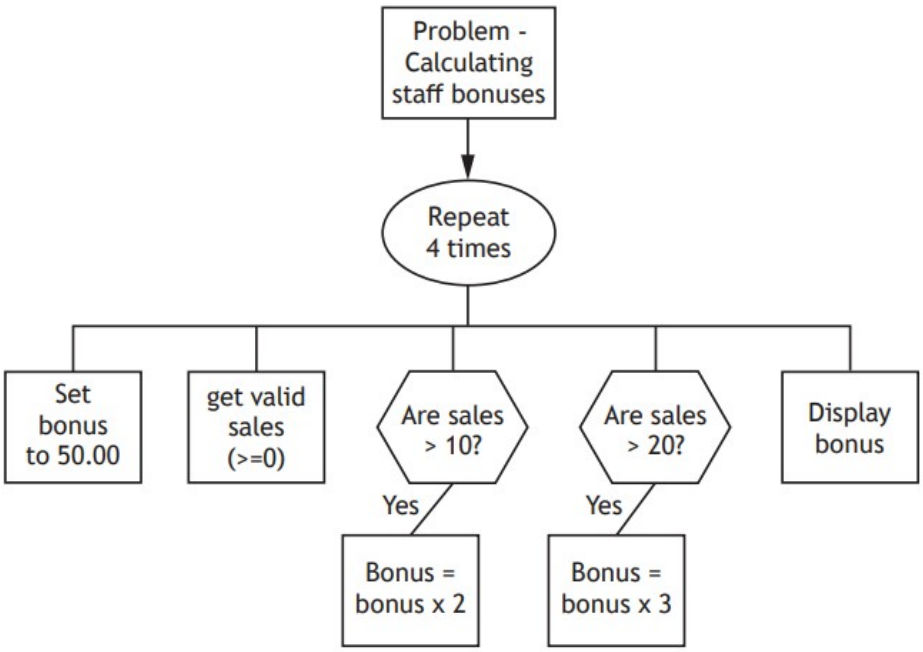
2.2 Ask user to enter first three letters of arrival airport

3.1 Store the booking reference as: arrival airport string + surname + departure airport string

(a) State which design technique has been used for the above solution. **(1)**

(b) State the output expected if the design is tested by Kate Bryant who is flying from Glasgow to Barcelona. **(3)**

SQP Q21cii Arthur's Antiques sells old furniture. All staff receive a monthly bonus of £50, which is increased if they sell over 10 items of furniture. The bonus is increased further if they sell over 20 items of furniture. A design for the program used to calculate the bonus payment for each of the four members of staff is shown below:



The program is further tested with normal test data. The results are shown below.

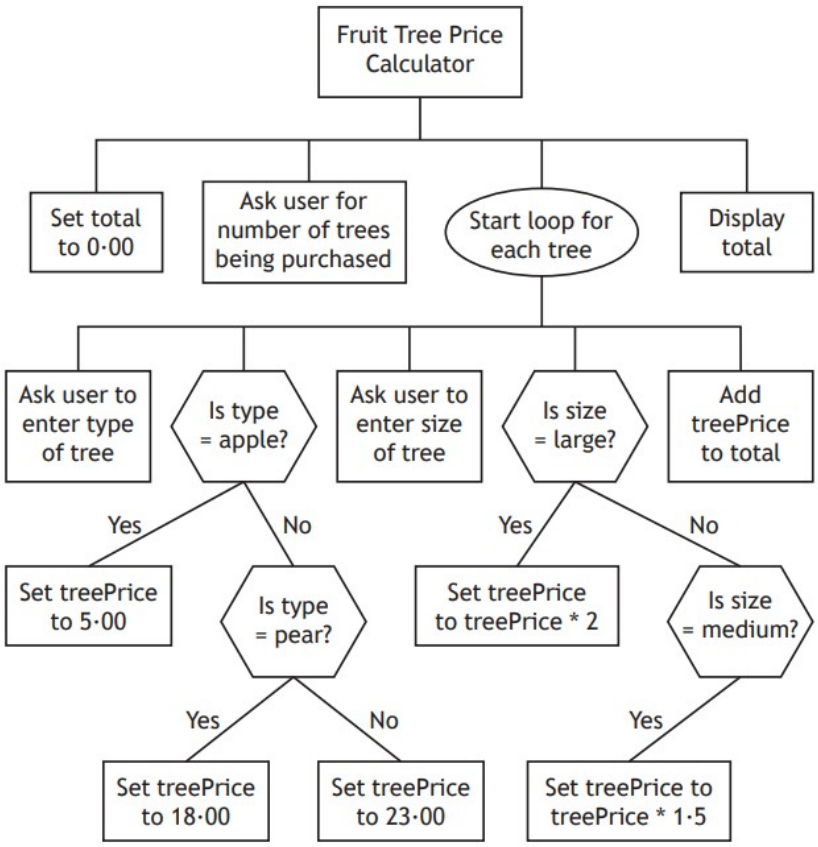
	Sales input	Expected output	Actual output
Staff 1	6	Bonus is 50	Bonus is 50
Staff 2	10	Bonus is 50	Bonus is 50
Staff 3	15	Bonus is 100	Bonus is 100
Staff 4	22	Bonus is 150	**Bonus is 300**

The test data for Staff 4 shows there is an error in the design.

(i) State the type of error. **(1)**

2019
Q5

A garden centre requires a program to calculate the price of apple, pear and cherry trees being sold. The design is shown below.



a) State the type of loop shown in the design above. **(1)**

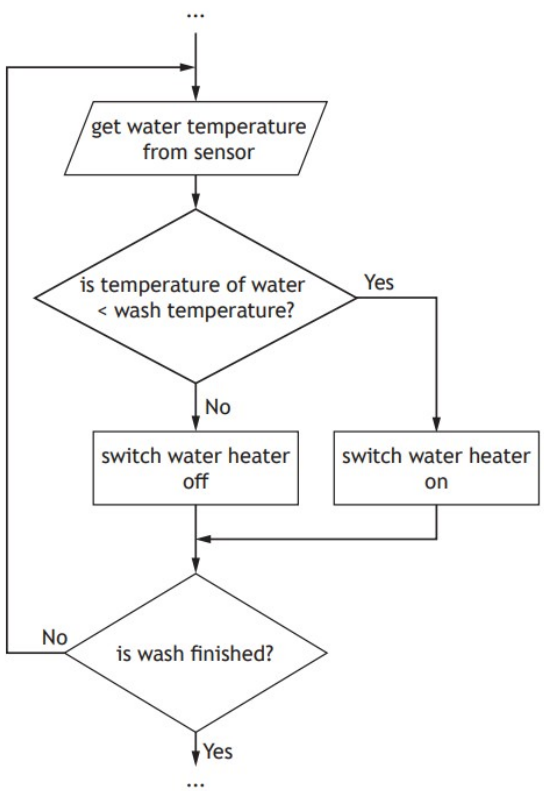
b) The design is tested. For the following inputs state the total displayed. **(1)**

Inputs	Total displayed
Number of trees – 2 Type of tree – cherry Size of tree – small Type of tree – pear Size of tree – medium	

c) The garden centre is considering selling orange trees for £23·00. Explain why the design does not need to be changed. **(1)**

2019
Q16

A program to control the water temperature inside a washing machine is being designed. The user will select a wash temperature using the control panel on the machine. The program should ensure that the water stays heated at the correct temperature throughout the wash. The design for the part of the program that maintains the water temperature is shown below.



A) State the design technique that has been used to design the solution. **(1)**

B) To implement the program several programming constructs will be required.

(i) State the condition used in the loop construct. **(1)**

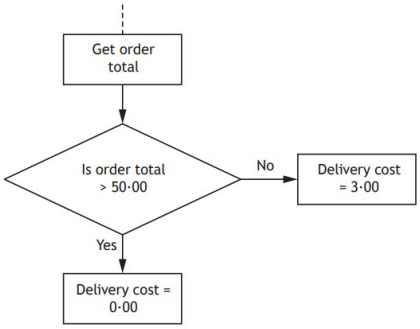
(ii) State one other construct that has been used in the design and describe how that construct has been used. **(2)**

C) When the wash is finished, the water will drain out. A sensor continuously detects the amount of water in the machine during the draining process. When there is no more water in the machine the door will automatically open.

Using a design technique of your choice, design a solution to this problem. **(3)**

2017
Qu13

Part of the design of a program is shown below.

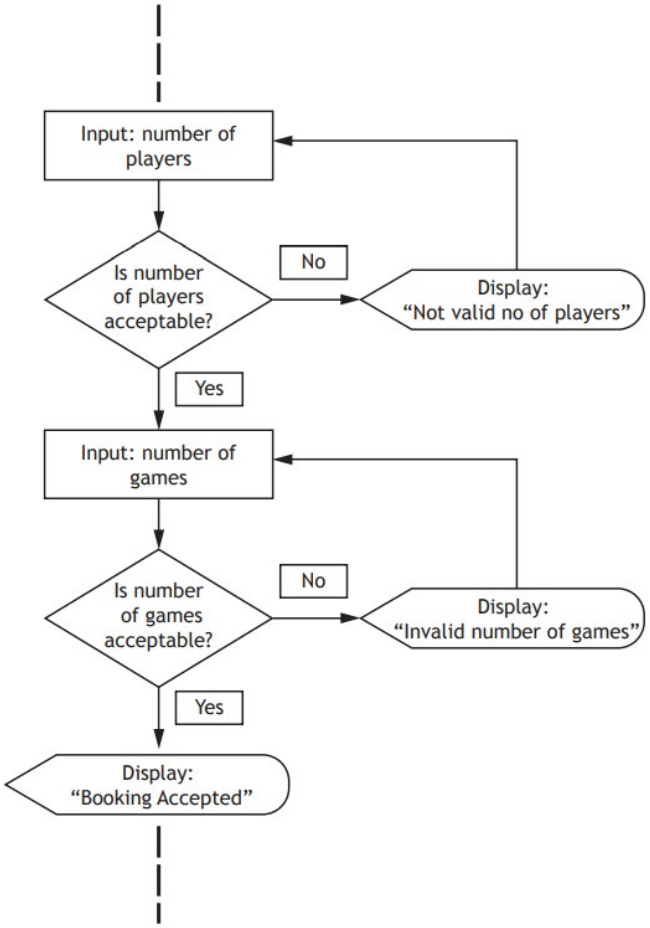


2016
Qu21a

Identify the graphical design notation shown above. **(1)**

A software developer is creating an online booking system for a bowling alley. Customers can book a bowling lane for a maximum of 4 people playing a maximum of 3 games. The developer has used a flow chart to produce the program design. Part of the design is shown below.

SQP Q16b



i) State one benefit of using the design notation shown above instead of pseudocode.**(1)**

2018 Q19d

ii) Name the algorithm illustrated in the bowling alley program design. **(1)**

Pam is creating an application that will find and display a person's tax rate based on their salary.

2018 Q21a

Salary	Tax rate
0–12000	0
12001–40000	20
40001 upwards	40

Using a design technique of your choice, design an efficient solution to the problem of finding a person's tax rate. **(4)**

A program is being designed that will allow pupils to add money to their lunch money account. The user enters their name, an 8 character password and the amount of

money they want to add. A button is then clicked and the updated balance of the account is displayed.

Using a design technique of your choice, design an efficient solution to ensure that a password of only 8 characters can be entered. An error message should be displayed if the incorrect number of characters is entered, and the user asked to re-enter the password. **(4)**

A program will calculate the total cost when customers purchase tickets to a theme park. Adults pay £25 per ticket; children pay £10. If there are two or more adults with more than two children a discount of £5 is subtracted from the total cost.

2016 Q12

2016 Qu18d

Algorithm

1. Store cost of adult and child ticket
2. Get name of person making booking
3. Get quantity of tickets
4. Calculate total cost
5. Display food voucher message

Refinement

2.1 Get first name
2.2 Get second name

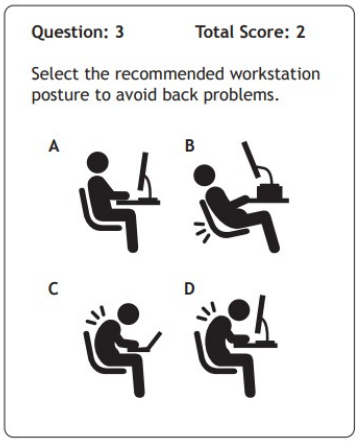
3.1 Get quantity of adult tickets
3.2 Get quantity of child tickets

Using a design technique of your choice, refine step 4. **(6)**

A running group has 16 members. They are taking part in a marathon. Using pseudocode or a programming language of your choice, write the code which will take in each runner's time for the marathon. **(2)**

2019 Qu3

Using pseudocode or a programming language of your choice, write the code to show how the total score is calculated when the user answers question 3 correctly. **(2)**



A bank requires a program for loan applications. The user will enter how much money they want to borrow and the number of monthly repayments. The user will then be informed how much they must repay each month. Using the information above, design a user interface for the program. **(3)**

Implementation (data types/structures)

SQP Q14b

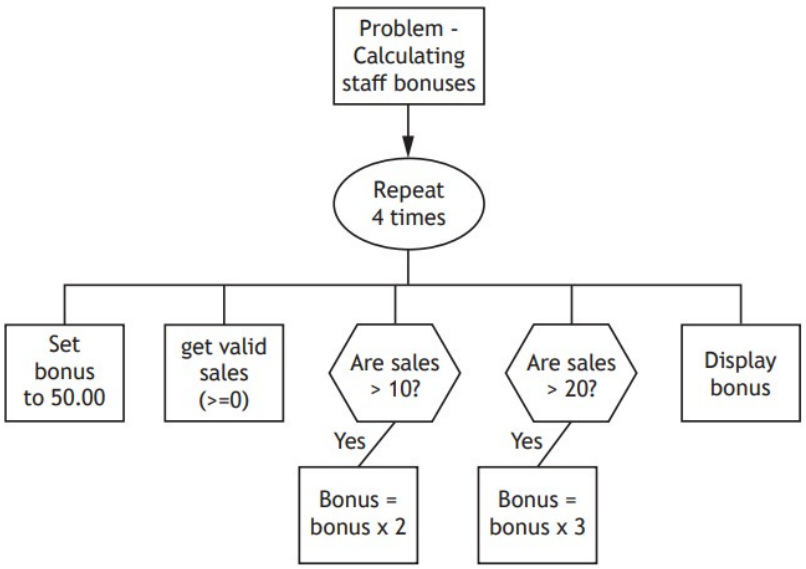
Mark writes a program to calculate a worker's average weekly wage. The first part of the program asks the user to log in. They are given three attempts to enter the correct password which is 'Bingo'

. . . .
Line 6 SET attempts TO 0 Line
7 REPEAT
Line 8 RECEIVE password FROM KEYBOARD
Line 9 SET attempts TO attempts +1 Line 10 UNTIL
. . .

State the data type of the variable password. **(1)**

SQP Q21a

Arthur's Antiques sells old furniture. All staff receive a monthly bonus of £50, which is increased if they sell over 10 items of furniture. The bonus is increased further if they sell over 20 items of furniture. A design for the program used to calculate the bonus payment for each of the four members of staff is shown below.



List the variables and data types that would be required to implement the design. The first one has been completed for you. **(2)**

Variable name	Data type
loop	integer

2019
19ci

A single ball can achieve a variety of different possible scores. Two versions of input validation were coded and tested to check that only valid scores are entered

Version A

```
...
Line 6   RECEIVE ballScore FROM KEYBOARD
Line 7   WHILE ballScore < 0 OR ballScore > 75 DO
Line 8      RECEIVE ballScore FROM KEYBOARD
Line 9   END WHILE
```

Version B

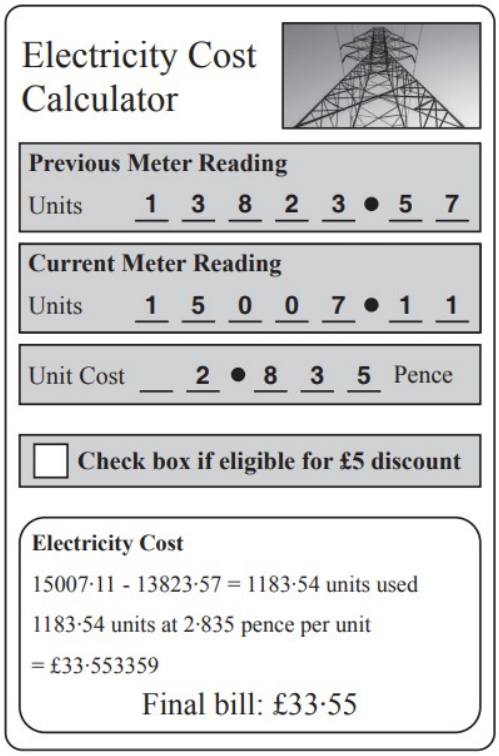
```
Line 1   DECLARE possScore INITIALLY
         [0,5,20,25,30,50,75]
...
Line 6   DECLARE found AS BOOLEAN INITIALLY false
Line 7   REPEAT
Line 8      RECEIVE ballScore FROM KEYBOARD
Line 9      FOR check FROM 0 TO length(possScore)-1 DO
Line 10        IF possScore[check] = ballScore THEN
Line 11           SET found TO true
Line 12        END IF
Line 13     END FOR
Line 14  UNTIL found
```

Explain why it would not be appropriate to use the input validation shown in Version A.
(1)

2019
13c

A possible user interface for the app is shown below.

2018
17ai



State the data types that will be required to store the values of the following inputs. **(2)**

The current meter reading	
Check box if eligible for £5 discount	

2017
Qu3

Scott is developing an online quiz with ten true or false questions. At the end of the quiz, the user's final score will be calculated

2017
Q15a

Explain why a 1-D array of Boolean values is a suitable data structure to store the user's responses. **(2)**

The validity of a password is checked as part of a program.

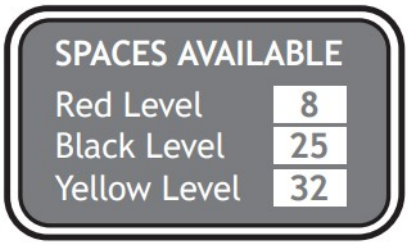
```
. . . Line 8 SET passValid TO false
Line 9 RECEIVE userPassword FROM (STRING) KEYBOARD
Line10 IF userPassword = storedPassword THEN
Line 11 SET passValid TO true
Line 12 END IF
. . .
```

State the data type used to store the variable "passValid". **(2)**

A program is being developed to monitor the availability of parking spaces in a multi-level car park. The car park has three levels, each with 50 numbered spaces and a digital display board that shows the number of spaces available on each level.

2016 Q16b

Level	Numbered Spaces
Red	1–50
Black	51–100
Yellow	101–150



2016 Q19a

Part of the program is shown below:

```
Line 1    DECLARE redAvailable AS INTEGER INITIALLY 50
Line 2    DECLARE blackAvailable AS INTEGER INITIALLY 50
Line 3    DECLARE yellowAvailable AS INTEGER INITIALLY 50
. . .
. . .
                < vehicle is detected occupying a space>
. . .
. . .

Line 22   IF spaceNumber ≥1 AND spaceNumber ≤50 THEN
Line 23       redAvailable = redAvailable – 1
Line 24   END IF

. . .
. . .
```

Explain why integer data types are used in Lines 1 to 3. **(2)**

When a pupil enters the answer it is stored in a variable called "guess". State the data type stored by the variable "guess". **(1)**

Gillian designs a program to calculate how much it costs to get her dog Penny groomed. The design is shown below.

Line 1 SET total = 0

Line 2 DECLARE all costs INITIALLY [35.00, 36.00, 40.00, 35.00, 42.50]
Line 3 FOR EACH cost FROM all costs DUE
Line 4 SET total=total+cost
Line 5 END FOR EACH
Line 6 SEND “The total cost = £“&total TO DISPLAY

Describe the data structure that has been used to store the individual costs. **(2)**