 **Name:** _____

## DATA REPRESENTATION

*Describe floating point representation of positive real numbers using the terms mantissa and exponent*

**SQP Q12**

**12.** The value 195 would be stored in a computer system using 'floating-point representation' as shown below:

$$0{\cdot}195 \times 10^3$$

Identify the mantissa and exponent in the above floating-point representation. **2**

Mantissa _____

Exponent _____

**2019 Q13d**

**13. (continued)**

(d) The current meter reading of 15007·11 would be stored in a computer system using floating-point representation as shown below.

$$0{\cdot}1500711 \times 10^5$$

Identify the mantissa and exponent in the above floating-point representation. **2**

Mantissa _____

Exponent _____

**2018 Q4b**

(b) The value 765·2 would be stored in a computer system using 'floating-point representation' as shown below.

$$0{\cdot}7652 \times 10^3$$

Identify the mantissa and exponent in the above floating-point representation. **2**

Mantissa _____

Exponent _____

**2017 Q2**

2. Describe how a real number is stored in a computer's memory. **2**

## DATA REPRESENTATION

*Convert from binary to denary and vice-versa*

**SQP Q1**

1. Convert the following 8-bit binary number into denary. **1**

1011 0111

**2019 Q1**

1. Convert the following 8-bit binary number into denary. **1**

1011 1001

**2018 Q22a(i)**

(a) The computer system stores the time and scores as binary numbers and the text using extended ASCII code.

(i) In the box below, show how the value 54 would be stored as an 8-bit binary number. **1**

**2017 Q15d**

**15. (continued)**

(d) Each of the parking space numbers is stored in binary.

State the decimal equivalent of the binary number 01101100. **1**

**2016 Q1**

**1.** Convert the decimal value 227 into the equivalent 8-bit binary number. **1**

## DATA REPRESENTATION

*Describe how extended ASCII code (8-bit) used to represent characters*

**SQP Q6**

**6.** An ASCII character set contains both control characters and printable characters.

State one example of each. **2**

Control character

Printable character

**2019 Q13b(ii)**

(ii) State a standard code used to represent text characters and the number of bits used to store each character. **2**

Standard code

Number of bits

**2018 Q22a(ii)**

(ii) Calculate the number of bits required to store the text '2ND HALF'. **2**

**2017 Q15c(ii)**

(ii) Each of the letters of the message **FULL** will be stored as an ASCII character.

Calculate the number of bits required to store this message. **1**

## DATA REPRESENTATION

*Describe the vector graphics method of graphic representation for common objects:*

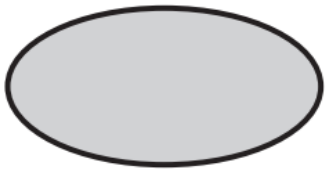
- *Rectangle*
- *Ellipse*
- *Line*
- *polygon*

*with attributes:*

- *Co-ordinates*
- *Fill colour*
- *Line colour*

**SQP Q8**

**8.** A vector graphic file stores objects and their attributes.



(a) State the name of the object shown above. **1**

(b) State two attributes of this object. **2**

Attribute 1

Attribute 2

**2019 Q12**

**12.** The line below is stored as a vector graphic.



State one attribute of this object. **1**

**2018 Q22b**

**22. (continued)**

(b) The scoreboard highlights some of the information it displays using coloured objects. These are stored as vector graphics.

(i) State the name of the object. **1**

(ii) State two attributes of this object. **2**

Attribute 1

Attribute 2

**2017 Q4**

**4.** Describe how vector graphics are stored in a computer. **2**

## DATA REPRESENTATION

*Describe the bit-mapped method of graphics representation*

**SQP Q18 e(i)**

(i) Describe how a bit-mapped graphic is represented in a computer system's memory. **2**

**2019 Q13b(i)**

(b) The user interface design is implemented. It contains a bit-mapped graphic and some text.

(i) Describe how a bit-mapped graphic would be stored. **2**

## COMPUTER STRUCTURE

*Describe the purpose of basic computer architecture components and how they are linked together:*

- *Processor (registers, arithmetic and logic unit, control unit)*
- *Memory locations with unique address*
- *Buses (data and address)*

**SQP Q21d**

(d) When the program is running it carries out the following tasks:

- stores the original bonus value of 50
- checks if sales > 10

(i) State the part of the processor that would temporarily store the value 50. **1**

(ii) State the part of the processor that would compare the sales value to the value 10. **1**

---

**2019 Q10b**

**10.** A database query design includes the following conditions in the search criteria.

```
delivery > 01/05/2019 AND delivery < 31/05/2019
```

(b) State the part of the processor where these conditions will be evaluated. **1**

**2019 Q16d**

(d) When the program is implemented, the water temperature will be stored in the memory of the washing machine's built-in computer.

(i) State the bus used to transfer the stored water temperature to the processor. **1**

(ii) Explain how a computer system organises data in memory so that it can be retrieved. **2**

**2018 Q21b(iii) & Q21b(iv)**

21. 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.

(iii) State the processor component that calculates the total cost. **1**

(iv) Name the part of the computer system that transfers the value of totalCost from main memory to the processor. **1**

**2017 Q15b**

(b) Name the part of the computer system that will carry out each of the following tasks during the execution of Line 23.

(i) Carries the location of redAvailable in main memory. **1**

(ii) Transfers the value of redAvailable from main memory to the processor. **1**

(iii) Calculates the new value of redAvailable. **1**

**2016 Q5**

5. State the function of a processor's registers. **1**

**2016 Q19b(ii)**

(ii) Describe how the contents of the variable total would be stored in the computer's memory. **2**

**COMPUTER STRUCTURE**

*Explain the need for interpreters and compilers to translate high-level program code to binary (machine code instructions)*

**SQP Q19d**

**19.** 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

(d) When implementing the above solution, describe one advantage of using an interpreter and one advantage of using a compiler to translate the program code into binary. **2**

Interpreter

Compiler

**2019 Q16e**

**16.** 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.

(e) The finished program was compiled before it was stored in the washing machine's memory.

Explain why this program was compiled. **1**

**2018 Q17b**

**17.** 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.

(b) Explain why the quiz program would be compiled. **1**

**2017 Q15e**

**15.** 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.

(e) While the parking space program is being developed, it is executed using an interpreter.

(i) State one advantage of using an interpreter rather than a compiler at the development stage of a program. **1**

(ii) The finished program is compiled.

State two advantages of executing a compiled version compared to an interpreted version. **2**

Advantage 1 _____

Advantage 2 _____

**2016 Q11**

**11.** Translators are used to convert high level languages into machine code.

Identify each type of translator.

| | **Type of Translator** |
|---|---|
| This translator program reports errors at the end of translation. | |
| This translator needs to be present in memory each time the program is executed. | |

**2**

## ENVIRONMENTAL IMPACT

*Describe the energy use of computer systems, the implications on the environment, and how these could be reduced through:*

- *Settings on monitors*
- *Power-down settings*
- *Leaving computers on stand-by*

**SQP Q11**

**11.** Switching off a computer system when it is not being used reduces energy use.

Describe two other methods of reducing the energy use of a computer system. **2**

Method 1

_____

Method 2

_____

**2018 Q22c**

**22.** An electronic scoreboard is operated by a computer system.

(c) Describe a feature or function of the computer system that could be used to reduce the amount of energy it uses. **1**

## SECURITY PRECAUTIONS

*Describe the role of firewalls*

**SQP Q5a**

**5.** The Bank of Aberdeen uses a firewall and encryption to ensure data is kept secure.

(a) Explain the purpose of a firewall. **1**

**2019 Q15d (also encryption)**

**15.** Chill Zone is an online electrical retailer. Fridge freezers need to be added to its current website.

(d) State one security precaution that Chill Zone should take to protect its customers' payment details when buying online. **1**

**2016 Q20a**

(a) Explain the purpose of a firewall. **1**

## SECURITY PRECAUTIONS

*Describe the use made of encryption in electronic communications*

**SQP Q5b**

(b) Explain how encryption can keep data secure. **1**

**2018 Q6**

**6.** State a precaution used to secure data in electronic communications. **1**

**2016 Q20b**

(b) Explain how encryption can help keep data safe. **2**