Starter - Homework

- **Check your homework with the answers I have provided you with in your notebook. Mark any incorrect answers but keep your final score the same and record in your notebooks.**

My Scores:

1	2	3	4	5	6
/20	/20	/20	/20	/20	/20

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Cambridge Assessment
International Education

Cambridge International School

Lesson 3
ASCII

Unit 1
Data Representation

```
!"#$%&'()*+,-./012
3456789:;<=>?@ABCDE
FGHIJKLMNOPQRSTUVWX
YZ[\]^_`abcdefghijk
lmnopqrstuvwxyz{|}~
```

Mr. Teasdale

Today we are going to…

To understand how computers represent characters

Success Criteria

Must — Explain the term character set and the use of binary codes to represent characters

Should — Use the ASCII character set to find the binary representation of a piece of text

Could — Understand the difference in the representation of numbers in ASCII and pure binary

Representing text

- **We have seen that positive integers can be represented in binary**

- **Negative numbers, and numbers with a decimal point, can also be represented as "pure" binary numbers**

- **But what about text?**

- **A different system is needed**

Literacy Focus

- ❑ ASCII

- ❑ Character set

- ❑ Extended ASCII

- ❑ Unicode

My Success Criteria

- ❑ Explain the term character set and the use of binary codes to represent characters
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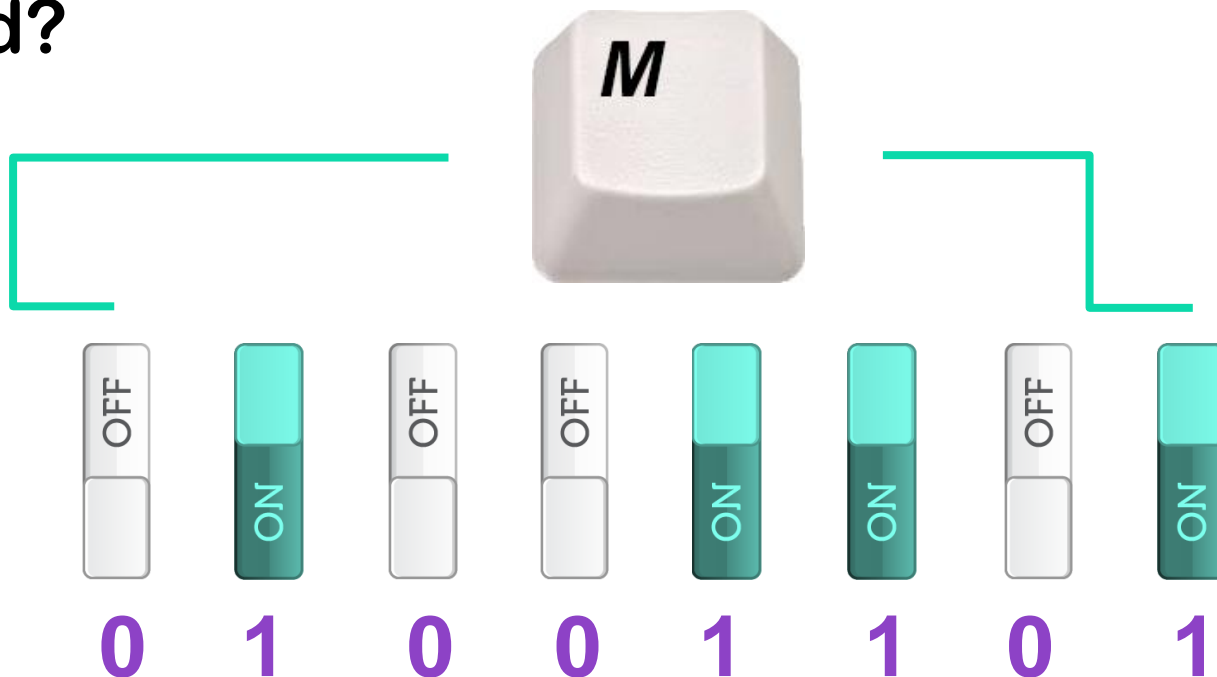
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Representing text characters

- **If a computer understands only 1s and 0s, what happens when the 'M' key is pressed on the keyboard?**

M

0 1 0 0 1 1 0 1

Literacy Focus

- ❑ ASCII
- ❑ Character set
- ❑ Extended ASCII
- ❑ Unicode

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Representing characters in binary

REMEMBER

- **Every character on the keyboard is represented by a binary value**

  - **Uppercase letters (capitals)**

  - **Lowercase**

  - **Punctuation symbols have their own characters**

- **How many characters are there on a standard keyboard? How many bits would be required to represent this many combinations?**

10 digits:
0123456789

26 lower case letters:
Abcdefghijklmnopqrstuvwxyz

26 upper case letters:
ABCDEFGHIJKLMNOPQRSTUVWXYZ

33 special characters:
`~!@#$%^&*()-_=+[]\{}|;':",./<>?

Literacy Focus

- ❑ **ASCII**

- ❑ **Character set**

- ❑ **Extended ASCII**

- ❑ **Unicode**

My Success Criteria

❑ **Explain the term character set and the use of binary codes to represent characters**
❑ **Use the ASCII character set to find the binary representation of a piece of text**
❑ **Understand the difference in the representation of numbers in ASCII and pure binary**

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The ASCII code

- **ASCII (American Standard Code for Information Interchange) has become the standard code, used worldwide**

- **It was originally developed in the 1960s for representing the English alphabet**

- **It encodes 128 characters into 7-bit binary codes**

- **Characters include numbers 0 to 9, uppercase and lowercase letters A-Z, a-z, punctuation symbols and a space character**

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- ❑ Extended ASCII
- ❑ Unicode

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ASCII Table

- In a word processor or Notepad, try pressing *ALT+65* on your keyboard (hold down the *ALT* key while you type 65 using the numeric keypad on the right of the keyboard)

- Try typing your initials using *ALT* key combinations

Decimal	Binary	Character	Decimal	Binary	Character	Decimal	Binary	Character
32	00100000	space	64	01000000	@	96	01100000	'
33	00100001	!	65	01000001	A	97	01100001	a
34	00100010	"	66	01000010	B	98	01100010	b
35	00100011	£	67	01000011	C	99	01100011	c
36	00100100	$	68	01000100	D	100	01100100	d
37	00100101	%	69	01000101	E	101	01100101	e
38	00100110	&	70	01000110	F	102	01100110	f
39	00100111	'	71	01000111	G	103	01100111	g
40	00101000	(	72	01001000	H	104	01101000	h
41	00101001	)	73	01001001	I	105	01101001	i

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7- and 8-bit ASCII

- **Numerous different codes for representing characters have been invented, but ASCII is commonly used nowadays on PCs**

- **Originally only 7 bits were used but now the eighth bit is used to give extra characters such as ©, ® and many more…**

How many different characters can be encoded using

7 bits? 8 bits? 16 bits?

Literacy Focus

- ❑ ASCII
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Using the eighth bit

- **Sometimes it is useful to be able to type special characters like á, à, ®**

- **Here are the codes for some of them:**

  © **Alt+0169**
  ® **Alt+0174**

  á **Alt+0225**
  à **Alt+0224**
  â **Alt+0226**
  ä **Alt+0228**

- **You can try them out!**

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Working with string input

- **In Python, two strings can be concatenated, or joined together, using the + symbol**

  firstname = input("Please input your first name: ")
  secondname = input("Please input your second name: ")
  fullname = firstname + " " + secondname
  print ("Your full name is ",fullname)

- **If you enter Mike for a first name and Bell for a second name, the computer will display**

  Your full name is Mike Bell

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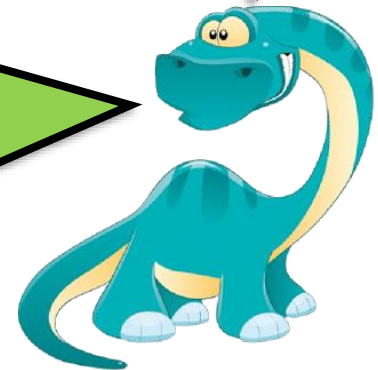
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Task! Worksheet 3

- Complete **Task 1** on the worksheet

Need some help?

Checkout the need help section

Challenge?

Checkout the want to go further section

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ASCII representation of numbers

- **Try typing *ALT + 55***

- **What is the binary representation of the ASCII character 7? Is this the same as the binary value for 7?**

- **Why not? What does this mean?**

Literacy Focus

- ❑ ASCII
- ❑ Character set
- ❑ Extended ASCII
- ❑ Unicode

Decimal	Binary	Character	Decimal	Binary	Character	Decimal	Binary	Character
48	00110000	0	53	00110101	5	58	00111010	:
49	00110001	1	54	00110110	6	59	00111011	;
50	00110010	2	55	00110111	7	60	00111100	<
51	00110011	3	56	00111000	8	61	00111101	=
52	00110100	4	57	00111001	9	62	00111110	>

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Converting ASCII to pure binary

- **Clearly, we cannot do arithmetic with ASCII characters**

- **Programming languages deal with the input of numbers in different ways**

- **In some languages, variables have to be declared as type char, string, integer, real etc.**

- **In other languages such as Python, all data is input as string, and if it is to be regarded as an integer, it has to be converted using an inbuilt function**

    e.g.   **xString ←USERINPUT**

               x = INT(xString)

Literacy Focus

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My Success Criteria

- ❑ Explain the term character set and the use of binary codes to represent characters
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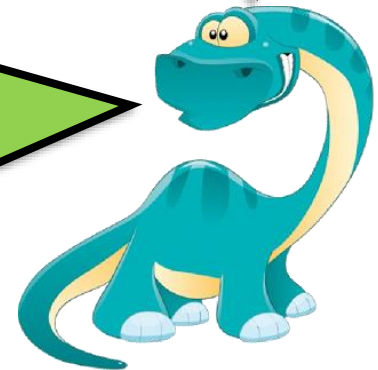- ❑ Understand the difference in the representation of numbers in ASCII and pure binary

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Task! Worksheet 3

• Now try Task 2

Need some help?

Checkout the need help section

Challenge?

Checkout the extension tasks!

My Success Criteria

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❑ Use the ASCII character set to find the binary representation of a piece of text
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Using different alphabets

To represent other alphabets for different languages, a new code allowing for many more characters is needed…

Unicode was developed to use 16 bits

- gives 65,536 possible combinations – enough to represent every character in every language

Literacy Focus

❑ ASCII

❑ Character set

❑ Extended ASCII

❑ Unicode

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Unicode

- To display the word **Olympian** in the Greek alphabet, for example, you could use the Control Panel in Windows to install a Greek keyboard

- Then, of course, you need to buy a new keyboard so you know where the letters are!

ολύμπιος

Literacy Focus

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Let's summarise…

- Characters are represented using the **ASCII** code

- **Seven** bits is enough to represent **all** the characters and symbols on an English keyboard

- The extended 8-bit ASCII code allows for **128 extra special** characters such as ©, ®, á

- You **cannot do arithmetic** on ASCII characters representing numbers – they must first be converted to pure binary numbers

- **Unicode** provides a unique binary code for every character in every language

Literacy Focus

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Checkpoint

Must

Explain the term character set and the use of binary codes to represent characters

Should

Use the ASCII character set to find the binary representation of a piece of text

Could

Understand the difference in the representation of numbers in ASCII and pure binary

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Cool down

1. Complete the skills 'checklist'

2. Answer the confidence question and complete a row in you progress diary

How confident do you feel about this topic?
(Delete the stickers you don't need)

I'm so confused!

I think I understand...

I've got it!

3. Review

Join my Quizlet class!

quizlet.com/join/rd4V Kwq6F

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Let's **Review**

Must — Explain the term character set and the use of binary codes to represent characters

Should — Use the ASCII character set to find the binary representation of a piece of text
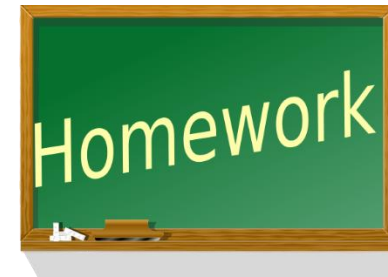
Could — Understand the difference in the representation of numbers in ASCII and pure binary

Homework

Homework is in your notebooks, complete for <u>next</u> lesson!

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- ☐ Explain the term character set and the use of binary codes to represent characters
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