

Unit 1 and 2

BSB Year 10

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Computer Science 0478

Answer Booklet



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This document contains all the answers to the worksheets and homework are supposed to have completed this year for the specific unit listed on the front cover. This will be useful to go through any incorrect answers for revision purposes or to catch up on any work that you missed. The answers are written in **RED**.

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Unit 1 Data Representation **Answers**

Worksheet 1: Binary systems

Task 1a

For each of the binary values below, write down the decimal equivalent. Use the grid below to help you.

1101 **13**

1111 **15**

00100110 **38**

10110111 **183**

128	64	32	16	8	4	2	1

Task 1b

For each of the decimal values below, write down the binary equivalent.

18 **00010010**

57 **00111001**

163 **10100011**

255 **11111111**

What do you think might happen with values above 255?

A ninth bit would be required to store numbers greater than 255.

Task 2

Mathematical symbols not represented by keys on the regular QWERTY keyboard are displayed on a computer monitor using an 8x8 grid. Working right to left, columns in the grid are given binary place values of 1, 2, 4, 8, 16, 32, 64 and 128.

The values from each row are stored in a table, using the place values to calculate the total. Row one in the figure below gives the value of 3.

Complete the values for rows 2-8 to store the square root character√.

1	6	3	1	8	4	2	1
2	4	2	6				
8							



Row	Value
1	3
2	4
3	4
4	204
5	104
6	120
7	48
8	16



Draw the lambda character formed from the data values in the table below:

1	6	3	1	8	4	2	1
2	4	2	6				
8							



Row	Value
1	96
2	16
3	16
4	24
5	56
6	52
7	101
8	194

The questions below use 16 bits. Complete the place value headings in the grid for the 10th-16th bits. Then convert the following binary numbers to denary.

0001 1100 0111 0001 **7,281**

0010 0110 0010 0110 **9,766**

1111 1111 1111 1111 **65,535**

327 68	163 84	819 2	409 6	204 8	102 4	512	256	128	64	32	16	8	4	2	1

Convert **19,675** to binary using the table below:

327 68	163 84	819 2	409 6	204 8	102 4	512	256	128	64	32	16	8	4	2	1
0	1	0	0	1	1	0	0	1	1	0	1	1	0	1	1

Homework 1: Binary systems

Give one reason why data is represented in binary in a computer [1]

The digits 0 and 1 can be represented by a switch being ON or OFF

How many bits are there in a byte? [1]

8

How many bytes are there in a MB? Include your working. [1]

1024 bytes in a KB. 1024 KB in a MB. 1024 x 1024 = 1,048,576 bytes in a MB.

(or, $2^{20} = 1,048,576$ bytes in a MB.)

A photographer takes up to 2000 photographs per week. Each photograph requires 5MB of storage on the camera's memory card.

Select the camera memory card with the smallest capacity that can store 2000 photographs. (Put a tick in the box next to your answer.)

$$2000 \times 5\text{MB} = 10,000\text{MB} = 10\text{GB}$$

Capacity in GB		
A	4	
B	8	
C	16	X
D	32	

[1]

(a) Write down the denary equivalent of the number below. You should include your working.

00000101 00010011 [1]

1,299

(b) Write down the 2-byte binary representation of the following denary number

1,201 [1]

00000100 10110001

A railway station proposes a new ticket machine to sell a variety of ticket types. Each ticket option is given a denary code which is converted to binary and stored in a 6-bit register. A second option to book a single or return journey is stored in an additional 2-bit register.

Type	Zone						Single or Return	
	1	2	3	4	5	6	Single	Return
Adult Peak	11	12	13	14	15	16	1	2
Adult Off-Peak	21	22	23	24	25	26	1	2
Child Peak	31	32	33	34	35	36	1	2
Child Off-Peak	41	42	43	44	45	46	1	2

Concession	51	52	53	54	55	56	1	2
Family Ticket	61	62	63	64	65	66	1	2

The register contents below indicates that a traveller has selected a Return ticket to Zone 3, paying an Adult Off-Peak fare.

6-Bit Register						2-Bit Register	
32	16	8	4	2	1	2	1
0	1	0	1	1	1	1	0

If an Adult traveller chose a Single journey to Zone 4 during Peak hours, what values would be stored in the registers?
[2]

0	0	1	1	1	0	0	1
---	---	---	---	---	---	---	---

If the register stores the value:

1	0	1	0	1	0	0	1
---	---	---	---	---	---	---	---

What ticket type has the traveller selected? [2]

Child Off Peak Single to Zone 2. ✓

The new machine is tested and gives an error message when selecting a Family ticket to Zones 4, 5 or 6.

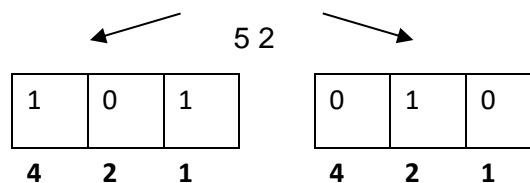
What is the problem with these ticket options? [1]

The maximum value that can be stored in 6 bits is 63. Values 64, 65 and 66 cannot be represented.

What could be done to overcome this problem? [1]

Increase the register size to 7 bits.

One new proposal has been to separate the two digits of the denary ticket code into two registers of 3 bits each.



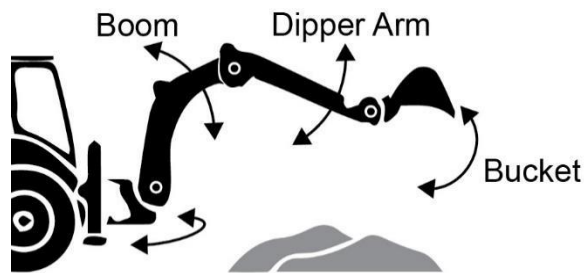
Give one advantage and one disadvantage of doing this. [2]

Numbers up to a maximum of 77 can now be stored, solving the problem of the Family tickets to Zones 4-6.

Previously only values 0-63 could be stored so an extra row of options from 71 to 76 could be included.

Denary code values containing an 8 or 9 cannot be stored.

A children's remote-control backhoe digger toy uses a register to control the various motors which are used to operate its arm and bucket.



Raise boom	Lower boom	Raise dipper arm	Lower dipper arm	Open bucket	Close bucket	Swing left	Swing right
0	1	0	1	0	1	0	0

Digger control register

The register currently contains instructions to lower the boom, lower the dipper arm and close the bucket in order pick up some sand.

Assuming the digger has picked up the sand, the machine now has to raise the boom, raise the dipper arm and rotate left to an awaiting dump truck.

What would be the contents of the register to perform this operation? [2]

1	0	1	0	0	0	1	0
---	---	---	---	---	---	---	---

The digger arm is now over the back of the truck. Set the register contents to empty the sand into the dump truck.

[2]

0	0	0	0	1	0	0	0
---	---	---	---	---	---	---	---

A simple computer device uses 1 byte to store memory addresses.

What is the maximum number of addresses that can be referenced? 256

What is the highest address, written in binary? 11111111

[2]

Worksheet 2: Hexadecimal

Task 1



1. Denary to Hexadecimal conversion

- Convert denary 19 to hexadecimal: 13
- Convert denary 5605 to hexadecimal: 15E5
- Convert hexadecimal 19 to denary: 25
- Convert hexadecimal A31F to denary: 41759

2. Binary to hexadecimal conversion:

- Convert binary 0011 0101 to hexadecimal: 35
- Convert binary 1101 0111 0110 1010 to hexadecimal: D76A
- Convert hexadecimal 1E to binary: 0001 1110
- Convert hexadecimal 14FF to binary: 0001 0100 1111 1111

Task 2

3. The blue colour  defined by the amount of red, green and blue it contains as 3D7EB5
- The green colour  represented by the following denary values:

Color model:	RGB	▼
Red:	11	▲▼
Green:	217	▲▼
Blue:	71	▲▼

- (a) Convert this representation to a 6-digit hexadecimal value representing RGB
- 0BD947
- (b) What would be the hexadecimal representation of a pure red colour?
- FF0000

4.

```
<!DOCTYPE html>
<html>
<head>
    <title>Hexadecimal Colour Codes</title>
<style>
h1{color: #ffffff}
#page /*assigns bgcolour*/
{
    background-color: #ffcc00;
}
</style>
</head>
    <body>
    <div id="page">
    <h1>
        Hexadecimal colour example
    </h1>
    This document uses hexadecimal colour codes to set the colours for the Heading text H1 and the page
    background.
    </div>
    </body>
</html>
```

- (c) What colour is represented by the hex code **ffffff** in the following line?
h1{color: #ffffff} **white**
- (d) What colour is represented by the hex code **ffcc00** in the following line?
background-color: #ffcc00; **yellow**
- (e) Experiment with changing the colours for the heading and background.

Task 3

5. The following MAC address is expressed as 12 hexadecimal digits.

23:E5:2B:C7:D7:4B

Convert this MAC address to its binary representation.

0010 0011 1110 0101 0010 1011 1100 0111 1101 0111 0100 1011

6. A programmer is trying to debug a program by looking at the contents of a portion of memory. She is trying to find four consecutive bytes holding the bit patterns 10101010, 11011011, 11001100, 11011101.

She has printed out the contents of a portion of memory in hexadecimal.

06 19 E2 FF 56 47 AE 5E 6A 7B 55 47 89 00 FE 3B BB CC DD EE 4E 6E 6B CB

56 57 D3 DE DA 5C CC DD 98 AA BB CC DD 00 21 AA ED BB 63 25 2F 2B 4C 4C

CC 5B 23 11 AA A0 BB CC DD 7F FF EE 99 34 50 98 67 E8 D9 FE AA BA BB 2E

Search the printout and ring the bytes containing the bit pattern she is searching for.

Homework 2: Hexadecimal

1. Convert the following values to and from Hexadecimal: (Show your working) [6]

- | | | | | |
|-----------|---------------------|----|--------|---------------------|
| a. Hex | 1A | to | Binary | 0001 1010 |
| b. Hex | 16A9 | to | Binary | 0001 0110 1010 1001 |
| c. Binary | 00110111 | to | Hex | 37 |
| d. Binary | 0001 1001 1111 1111 | to | Hex | 19FF |

2. A memory location is addressed using hexadecimal codes in the format SEGMENT:OFFSET. The codes for one specific location is 1A78:000D. [2]

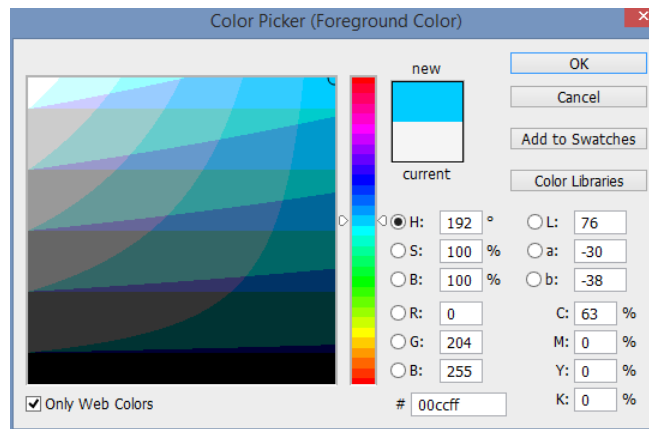
What are the decimal values for the segment and the offset?

Segment: 6776

Offset: 13

3. Colours in art packages are often given Hex codes as illustrated below with #00ccff representing Red, Green and Blue (RGB) values of 0, 204 and 255.

- (a) Why is Hex used in this way rather than the actual 24-bit colour value? [3]



It is easier for designers and software users to remember hex codes rather than a binary value.

The code only takes up six characters on screen rather than 24.

It is quicker/shorter/less prone to error to re-enter a six character Hex value to reproduce an exact colour than a long binary value.

(b) Calculate the Hex colour code if the colour RGB values were 10,169 and 42? Show your working. [3]

10 = 0a

169 = a9

42 = 2a

Code = 0aa92a. Ignore capitals or # symbol.

4. (a) Name **two** devices, apart from a PC, that have a unique MAC address. [2]

Any device that can connect to the Internet – mobile phone, tablet computer, kindle, router, laptop etc.

(b) A MAC address is expressed as a series of 12 hexadecimal digits. How many 8-bit bytes will the MAC address occupy? [1]

12 x 4 = 48 bits

= 6 bytes

(c) Why is the MAC address not expressed in binary? [1]

It is easier to read and easier to copy the hex code than a string of binary digits.

5. A byte in memory contains the bit pattern 0111 0101. This could represent an integer.

Name **two** other possible interpretations of this bit pattern.

[2]

part of an instruction, a text character, sound, graphic, colour, register controlling a robot, digital display, etc.

Worksheet 2: ASCII

Task 1

1. Write your initials in binary digits below using the ASCII table: - using the binary representation

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

2. Using the 8-bit ASCII set, what would be the total size in bytes of the words 'Computer Science'? - 16 characters - each character = 8 bits

16 (space is a character)

3. What is meant by a character set?

All of the characters recognised/represented by a computer system.

4. How many characters can be represented with the 7-bit ASCII character set?

128 - all the characters on the keyboard

5. The eighth bit is used to give an extra 128 characters. Any character in the ASCII table can be typed using the ALT key in combination with its ASCII code.

For example, if you type ALT + 065 on the numeric keypad, the letter A will appear.

What is the binary representation of the letter A?

0100 0001

Typing ALT + 0233 will produce é.

What is the binary representation of the letter é?

1110 1001

6. The function **ord(a)** returns the denary value of the ASCII representation of the character **a**.

The function **chr(i)** returns the character whose ASCII code is the integer **i**.

chr() is the opposite of ord() - ord turns representation into number

- chr turns denary number into character

The ASCII representation for A is 65 (denary).

What will be printed when the following program is run?

```
x = ord('C')
y = x + 3
z = chr(y)
print (x,y,z)
```

67 70 F

Task 2

7. A programmer writes the following lines of code in Python. All data is input as ASCII characters.

```
print("Please input an integer x: ")
x = input()
print("Please input a second integer y:")
y = input()
z = x + y
print ("x + y = ", z)
```

The user enters 7 and 4. What will be printed? Explain your answer. 74

The data is input as text, and the + symbol is used to concatenate the two ASCII data items input, whether they are text or numbers.

The programmer changes the second and fourth lines to read

```
x = int(input())
y = int(input())
```

The user enters 7 and 4. What will be printed? 11 - INT turns the representation 7 into a real number 7 - so entering 7 and 4 and turning them into numbers means addition can be performed - 7+4 = 11

The programmer changes the program to the following:

```
print("Please input an integer x: ")
x = input()
print("Please input a second integer y:")
y = input()
z = x - y
print ("x - y = ", z)
```

What will happen when the program is run? Why? **The program will crash as there is no operand "-" that can be applied to strings.**

An error message is displayed:

line 8, in <module>

s = x - y

TypeError: unsupported operand type(s) for -: 'str' and 'str'

Homework 3: ASCII

1. A simple three-letter code word is saved to a personal disk.

(a) What is the size in bytes of the code word? **3** [1]

(b) The code word is represented on the disk in a binary format, saved as:

01000011 01000001 01000010

Character	Binary
A	01000001
B	01000010
C	01000011
D	01000100
E	01000101

Using the section of the ASCII table above, what is the code word? **CAB** [3]

(c) What is the hexadecimal representation of the code word? **434142** [2]

(d) Calculate the denary value representing the letter E. **69** [1]

(e) The function **ord(a)** returns the denary value of the ASCII representation of the character **a**.

The function **chr(i)** returns the character whose ASCII code is the integer **i**.

What will be printed when the following program is run?

```
x = ord('G')
y = x - 2
z = chr(y)
print (x,y,z)
```

71 69 E [3]

2. A programmer writes the following lines of code in Python. All data is input as ASCII characters.

```
print("Please input an integer x: ")
x = input()
print("Please input a second integer y:")
y = input()
z = x + y
print ("x + y = ", z)
```

- (a) The user enters 6 and 3. What will be printed? 63 [1]
- (b) What corrections should the programmer make to ensure that the correct answer is printed? [2]

`x = int(input()), y = int(input())` or equivalent statements

3. Integers which are to be used in calculations are represented as pure binary numbers.

- (a) What is the pure binary representation of the number 76? 0100 1100 [1]

- (b) The ASCII character 7 is represented by the denary number 55.

Convert the ASCII string '76' to binary. [1]

00110111 00110110

- (c) Give **two** advantages of representing integers in pure binary. [2]

Pure binary numbers take up much less space

Calculations are much simpler

4. (a) What are the limitations of the 8-bit extended ASCII character set? [1]

Only 256 characters can be represented , so there is no way of representing alphabets other than

English

- (b) How can these limitations be overcome? [2]

By using Unicode which uses 16 bits, so that all characters in every alphabet can be represented, as well as many special characters

Worksheet 4: Images

1. This image uses four colours so requires 2 bits per pixel. Shade in the image as a computer using the key.

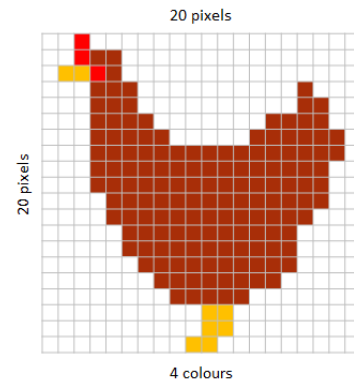
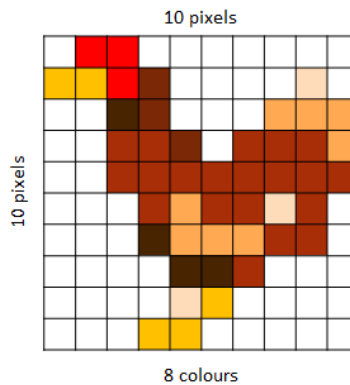
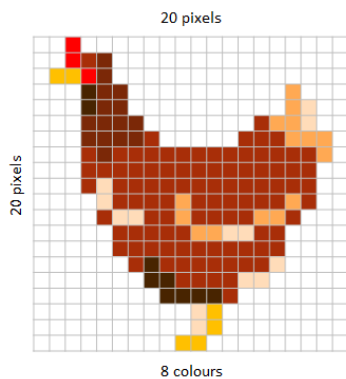
10	10	10	10	10	10	10	10	10	10	10	10	10	10
10	00	00	10	00	00	10	00	00	10	00	00	00	10
10	00	00	10	00	00	10	00	00	10	00	00	00	10
10	10	10	10	10	10	10	10	10	10	10	10	10	10
10	00	00	10	00	00	10	00	00	10	00	00	00	10
10	00	00	10	00	00	10	00	00	10	00	00	00	10
10	00	11	10	10	10	10	10	10	10	10	10	10	10
10	11	11	10	10	10	10	10	10	10	10	10	01	01
10	10	10	10	11	11	10	10	10	10	11	11	10	10
00	00	00	00	11	11	00	00	00	00	11	11	00	00

Key:

01	00	11	10
----	----	----	----

2. Calculate the file size of the following images:

	Image Resolution	Number of colours	Colour depth in bits	File size in bits	File size in Bytes
Image 1	20 x 20	8	3	1,200	150
Image 2	10 x 10	8	3	300	37.5
Image 3	20 x 20	4	2	800	100



3. How does increasing the image resolution affect the file size?

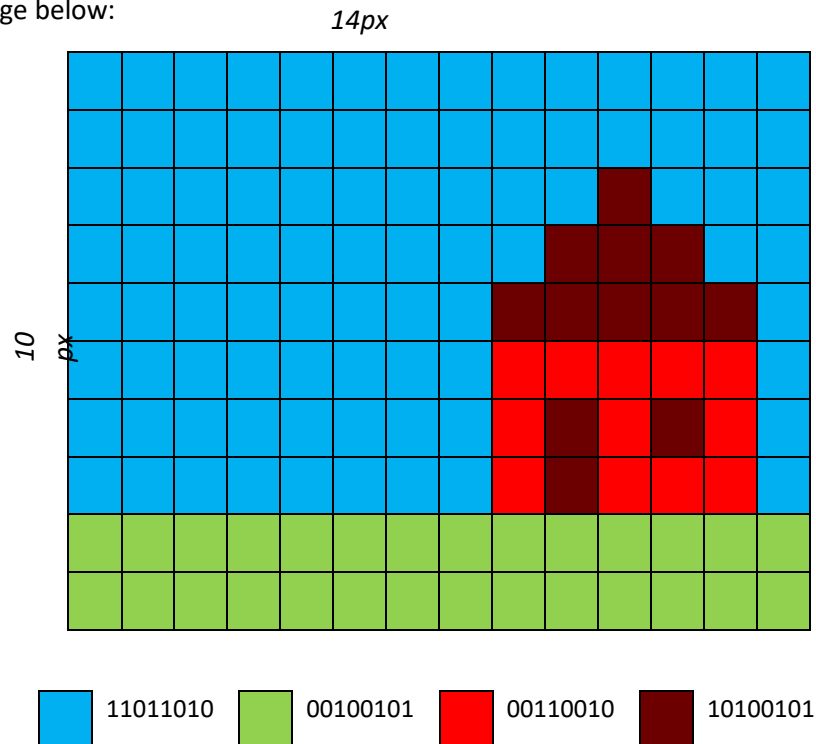
Increasing the resolution will increase the number of pixels used, therefore increasing the file size since each additional pixel will require extra binary data to store its colour value.

4. Explain the relationship between image quality and file size

As the number of pixels increases in the same area, the quality improves, as does the file size. As the number of colours in an image increases, the data required to store a greater number of colours increases, as does the quality and the file size.

Image Compression

5. Look at the image below:



The first and second rows of the image above would be stored as 14 lots of 11011010:

11011010, 11011010, 11011010, 11011010, 11011010, 11011010, 11011010, 11011010, 11011010, 11011010, 11011010, 11011010, 11011010, 11011010, 11011010

The same data could be stored as *00001110-11011010* (14 [binary 00001110] lots of 11011010) without losing any information required to piece together the image again. This is known as RLE or Run Length Encoding.

Record the data for the third, fourth and fifth lines in the image:

Line number	Binary image data
1	00001110-11011010
2	00001110-11011010
3	00001010-11011010, 00000001-10100101, 00000011-11011010
4	00001001-11011010, 00000011-10100101, 00000010-11011010
5	00001000-11011010, 00000101-10100101, 00000001-11011010

Homework 4: Images

1. How many bits per pixel would be required for an image with a palette of 256 possible colours? [1]

8

2. State two factors that affect the file size of a bitmap image. [2]

Colour depth / number of bits per pixel / number of colours in the image

Dimensions of the image in pixels / resolution - 'Size of the image' is not enough

3. Which icon image is greater in file size? (Show your working) [3]

- a. A 256 colour icon with dimensions of 50 x 50 pixels
- b. A 16 colour icon with dimensions of 100 x 100 pixels

- a. 256 colours require 8 bits. $50 \times 50 = 2,500$ pixels. $2,500 \times 8 \text{ bits} = 20,000 \text{ bits} / 8 = 2,500 \text{ bytes}$
 - b. 16 colours require 4 bits. $100 \times 100 = 10,000$ pixels, $10,000 \times 4 \text{ bits} = 40,000 \text{ bits} / 8 = 5,000 \text{ bytes}$
- Image (b) would have the greater file size.

4. Additional metadata data is stored alongside the binary colour values for each pixel. Give two examples of metadata. [2]

Answers include:

Dimensions / Width and height

Bit depth / colour depth / number of bits per pixel

File name

Date created / modified

File type

Author

5. Imran has saved following two images as bitmap file types.



Image A



Image B

- a. Give **one** reason why Image B appears blurred. [1]
Poor or low resolution, image has fewer pixels, or insufficient density of pixels
- b. Image A would also become blurred or pixelated if it was significantly enlarged. Why this would happen? [1]
Pixels become enlarged... as image is stretched. Density of pixels over a larger area becomes lower.
- c. Imran wishes to email one of the images using a low bandwidth Internet connection. He has chosen to send Image B. Suggest **two** reasons why? [2]

Image B is likely to have a smaller file size.
Smaller file sizes take less time to upload and send over an Internet connection.

6. Ray wants to reduce the file size of his images and has been recommended to use compression. State two types of compression and advise Ray of the advantages or disadvantages of each method. [6]

Compression types:

Lossy compression - example file type JPG

Lossless compression - example file type PNG

Features include:

Lossy compression removes data permanently

Lossy compression results in a much smaller file size than lossless

Lossy compression may cause colour banding

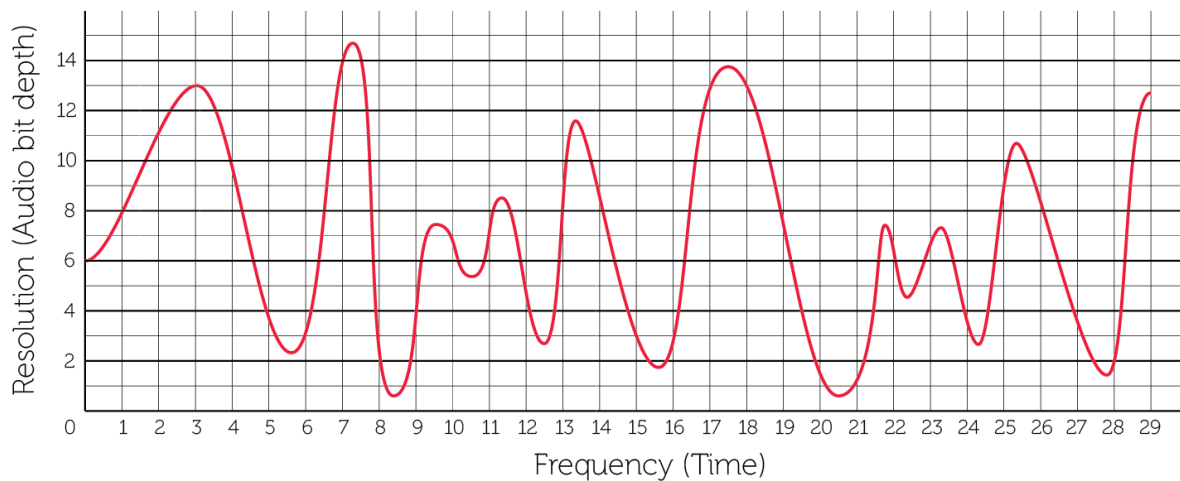
Lossy compression creates compression artefacts / can be of poorer quality

Lossless compression retains ALL original image data

Lossless compression results in a larger file size compared to lossy

Worksheet 5: Sampling sound

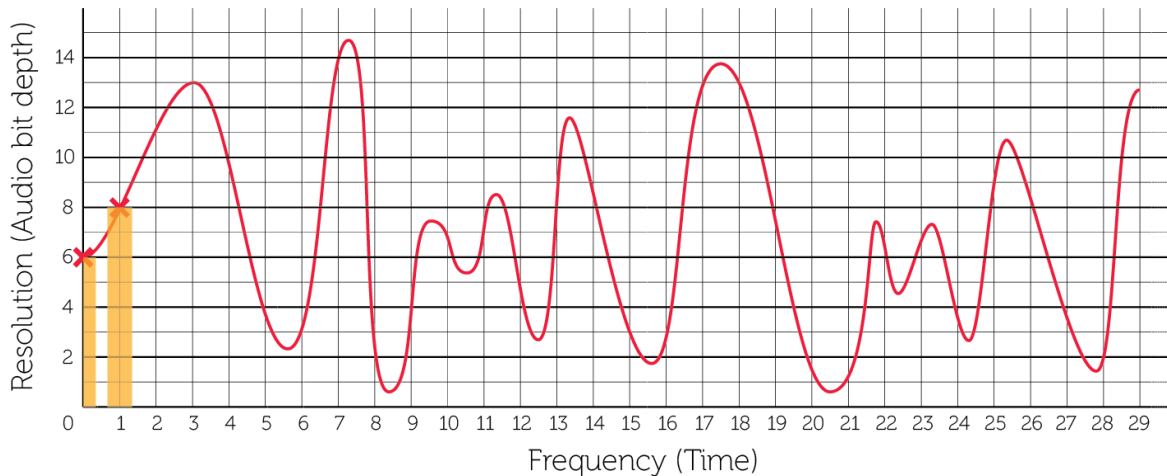
1. Look at the sound wave below and record the samples in the table beneath it. The first two are done for you. You can only plot a sample at an intersection. Use a 'best-fit' approach.



0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
6	8	11	13	9	4	3	14	2	3	7	7	4	7	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
3	3	13	13	7	2	1	6	7	5	9	8	4	2	13

(n.b. There is some margin for error in each of these points!)

2. Replot all of your figures on to the graph below and create a bar chart from the points. The first two points have been drawn for you.



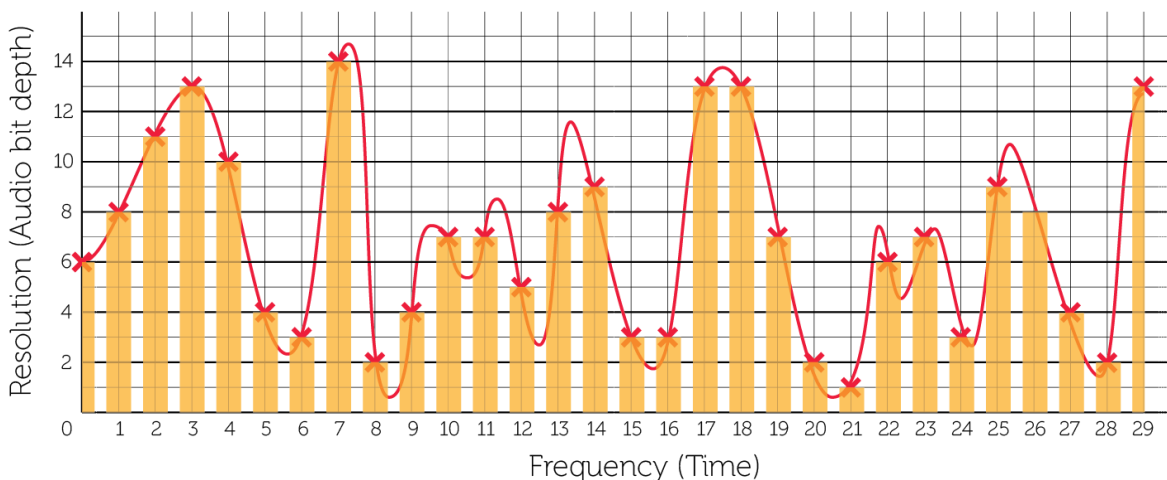
3. How accurately does this represent the original sound wave? Where are there inaccuracies in the digital reproduction of the wave?

The wave is reproduced with reasonable accuracy, to the point that you might actually recognise the tune (albeit in poorer quality) if this were a real practical example. The peaks and troughs of the wave are not represented accurately in the reconstructed drawing.

4. What would you need to do in order to improve the accuracy of the recording?

Take samples more frequently and increase the number of points on the Y axis at which you can record a sample.

Completed graph:



5. In reality, each of the measurements on the Y axis would be given a binary value and that would be recorded in the audio data file. Using Table 1 below write out the binary values for each of the first ten samples given in Table 2. There are 16 sampling points on the Y axis so a minimum of four bits must be used in order to provide enough different bit patterns for each sampling point.

Y	Bit value
---	-----------

1	0001
2	0010
3	0011
4	0100
5	0101
6	0110
7	0111
8	1000
9	1001
10	1010
11	1011
12	1100
13	1101
14	1110
15	1111

Table 1

Sample	0	1	2	3	4	5	6	7	8	9
Value	6	8	11	13	10	4	6	14	2	4
Binary value	0110	1000	1011	1101	1010	0100	0110	1110	0010	0100

Table 2

The Binary Values in the third row above represent the data that would be stored to recreate this very short sound file of 10 samples.

6. What would be the file size in bytes of the 10 samples in Question 5?

10 samples, each using 4 bits = 40 bits / 8 = 5 bytes

7. The **resolution** is the accuracy with which the wave height is measured – the higher the **resolution**, the more accurate the measurement at a particular sample point.
8. What would the file size of samples in question 5 become if you increased the resolution to allow for 256 different points on the Y axis?

256 points would require 8 bits. $8 \times 10 = 80$ bits or 10 bytes.

9. How would this affect the quality of the recording?

The recording quality would increase since the wave height with each sample could be recorded 16 times more accurately.

10. The **sampling frequency** is the frequency with which the measurements are taken – a higher **sampling frequency** means measurements are taken more often within the same period of time. How would this affect the quality of the recording?

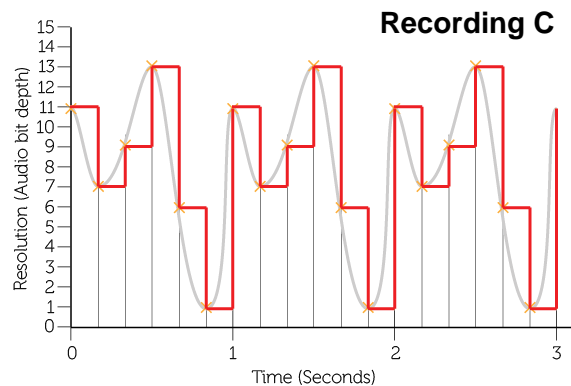
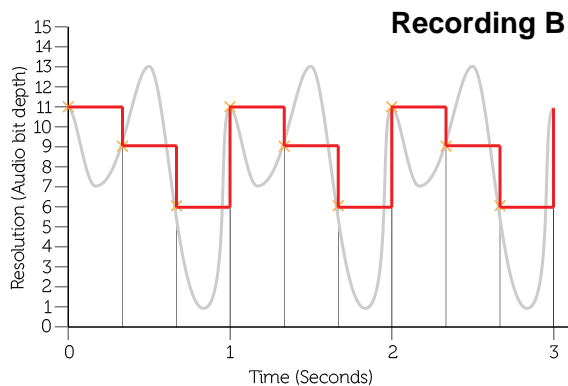
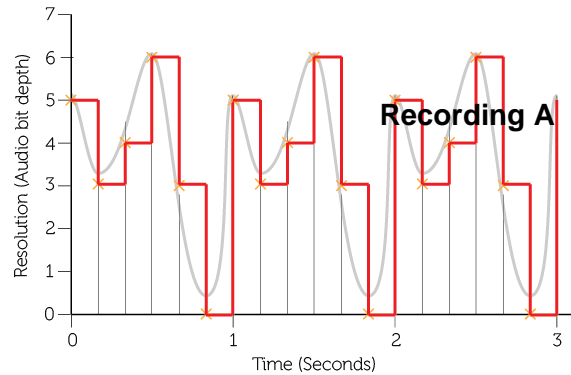
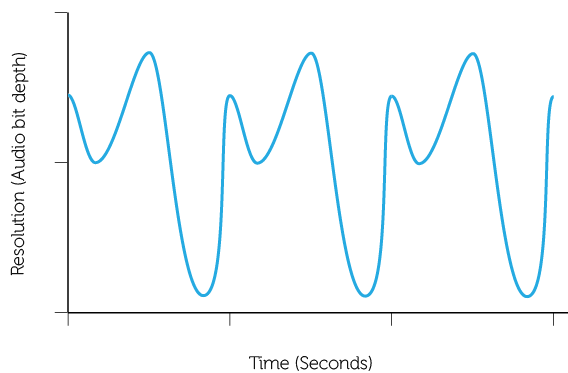
The more often you are able to sample, the more accurately you can record changes in the wave height, and therefore the more accurately you can reproduce the recording digitally to create a higher quality output.

11. Explain the relationship between the quality of playback and the file size.

As quality of playback increases, owing to a greater number of samples or a greater sampling accuracy, the more data is generated, and therefore the larger the sound file.

Homework 5: Sound

1. The first sound pattern below has been recorded three times using different digital sampling settings.



Calculate the file size of the each of the recordings A to C: (Show your workings)

[6]

A: Resolution has 8 points – 0-7. 3 bits per sample required to give a maximum of eight unique sample values.

Frequency is 6hz or 6 times per second over three seconds = 18 sampled points

$18 \times 3\text{bits} = 54\text{bits}$

*Note: This is a fractional sample of a sound wave, with a heavily simplified resolution and sample frequency. In reality, sound would be sampled many thousands of times a second (CD quality is at 44.1kHz or 44,100 samples per second) at a much higher resolution of perhaps 32 bits, (16bits for each stereo channel – Left and Right) producing much larger files! This example, with a sample resolution of only 3 bits per sample, and only six samples over 1 second, amounts to **18bits/s** or bits per second. Bits per second is a measurement of recording quality. Even a compressed MP3 file would be recorded at at least 128kbts/s or 128,000bits/s.*

B: 16 sampling levels requires 4 bits per sample x 9 samples

$9 \times 4\text{bits} = 36\text{bits}$

C: 16 sampling levels requires 4 bits per sample x 18 samples

$$18 \times 4\text{bits} = 72\text{bits} / 8 = 9 \text{ Bytes}$$

Allow one mark for each correct answer and an additional mark for the correct method.

Which of the recordings above will be of the highest quality? [1]

b. Recording C as it has the highest resolution and samples are taken more frequently.

State a device that is used to convert an analogue recording into a digital signal. [1]

a. Microphone

4. The length of a recording will heavily influence the size of the sound file. State two factors other than recording length that determine the file size of a recording. [2]

a. Sample rate / interval / frequency

b. Sample resolution / (audio) bit depth

5. Draw a line to match each file type to its appropriate description.

[5]

MP3 file	A commonly used image format used by digital cameras
MP4 file	An audio coding format which uses a form of lossy data compression
WAV file	A set of instructions for digital instruments to play synthesised sounds, commonly used for phone ring tones
MIDI file	A digital multimedia format most commonly used to store video and audio
JPEG file	An audio file format used for raw and typically uncompressed audio

Worksheet 6 Compression

Task 1

One lossless compression technique is to look for patterns in original source text to find repeating strings and then create a dictionary of these strings with a binary (or in this simpler example, a denary) code to represent them.

**Hickory, dickory, dock,
The mouse ran up the clock.
The clock struck one,
The mouse ran down,
Hickory, dickory, dock.**

Using this popular nursery rhyme and the dictionary below, complete the encoded and compressed version using the empty table underneath. The first part has been completed for you.

Code	Text	Code	Text
0	New Line	8	ran_
1	H	9	up_
2	ickory,_	10	the_
3	d	11	cl
4	ock	12	.
5	,	13	_struck_
6	The_	14	one,
7	mouse_	15	down,

1	2	3	2	3	4	5	0	6	7	8	9	10	11	4	12	0	6
11	4	13	14	0	6	7	8	15	0	1	2	3	2	3	4	12	0

1. If one byte was given to represent each code, what is the file size of the compressed text, excluding the codes themselves?

36 bytes

2. The original rhyme is 117 characters including spaces. Calculate the reduction in file size as a percentage.

$$117 - 36 = 81, 81 / 117 = 0.69 = 69\% \text{ reduction in file size}^*$$

* This excludes the code dictionary which in reality, must be recorded with the compressed data, but even if this were (approximately) 72 bytes in size, this, plus the coded data of 36 bytes would still be 8% smaller. Greater reduction is usually possible with larger amounts of original text.

Task 2

ABBA's Dancing queen is 39.79MB recorded at CD quality

When compressed using the MP3 compression format, this becomes 3.6MB

1. Calculate the Internet download speed for each file using a 24Mbps home connection and a 3G mobile connection. Use this [website](http://www.download-time.com) to help you. www.download-time.com

Quality	Download time at 24Mbps	Download time over 3G
CD	13 Seconds	46 Seconds
MP3	1 Second	4 Seconds

2. Give two advantages of using a compressed music format for streaming music over an Internet data connection.

Faster streaming; less buffering

Less data allowance is used on a pay-by-MB contract

Task 3

For each of the scenarios below, suggest whether lossy or lossless compression should be used.

Use	Lossy / Lossless	Reason
A music track	Lossy	Some recorded sounds are not detectable by the human ear, and no noticeable difference will be heard if some sound data is lost.
A text document	Lossless	All characters in a text document must be preserved.

A video clip	Lossy	Video data can easily be lost without affecting the quality too much.
A web image	Lossy	Images can still be recognised easily, even with large percentages of the original picture data lost.
A software application	Lossless	A software program may not run if a single character of data is missing.
A database	Lossless	Data must be reproduced exactly.

Homework 6 Compression

1. (a) Give **two** reasons why you might compress photograph files before emailing them to a friend.[2]

Reason 1. They will download much faster

Reason 2: The file size may exceed the limit of what can be attached to an email

- (b) Two forms of compression are lossy and lossless. State, giving reasons, which would be the most suitable form of compression to use when transmitting:

- (i) a draft manuscript for a book. [2]

Lossless – the manuscript cannot lose any of its content while being transmitted

- (ii) A video recording which you have made of the school play. [2]

Lossy – the file will be much smaller and the quality will still be acceptable

3. A lossless encoding algorithm used to compress an image converts the file by recording the colour code, represented here by a letter, followed by the number of pixels of the same colour, e.g. R4.

- (a) Give the result of applying the algorithm to the following data for an image: [2]

G	G	G	G	G	R	R	R	Y	Y	Y	Y	Y	Y	R	R	R	G	G	G	G
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

G5R3Y6R3G4

- (b) Is this lossy or lossless compression?

Explain your answer: [1]

Lossless – no data is lost and the image will be restored exactly as it was when decompressed

Unit 2 Communication and Internet Technologies

Answers

Worksheet 1 Data transmission

Task 1

1. Use the link to: www.submarinecablemap.com to view the map of undersea cables used for Internet communication.
2. Use the link to: www.speedtest.net to test your Internet speed.

Why do you think have a different speed for uploading and downloading?

Downloading speeds are usually faster as more data is downloaded rather than uploaded. This is often an 80/20% split of the available bandwidth. [2]

Can data be sent in both directions?

Data can be sent in both directions. This will become more relevant later in the lesson when students look at duplex transmission. [1]

Task 2

1. Akin is a network administrator and is looking to provide suitable cabling for the following purposes:

Complete the table below, suggesting either serial or parallel cables for each use.

Purpose	Serial or parallel?
Connecting from a central server to a computer suite in a separate building	Serial. Distance too long for parallel cables.
Connecting a web cam to a local computer	Serial, via USB
Connecting an internal hard disk to the CPU	Parallel (Although newer serial cables are doing the same job as well.)

[3]

2. Explain the problem known as 'skew' with parallel transmission.

Parallel wires all have different properties; which affect the speed at which signals (bits) travel. This means each bit arrives out of sync. [2]

3. Integrated circuits are used in the manufacture of computer motherboards. State which transmission method is used with an Integrated Circuit and give one reason why.

Parallel transmission is used within IC chips. The minute distances make parallel very quick and avoid all problems of crosstalk and skew. [2]

4. Explain what is meant by the following terms:

Serial, duplex transmission: Data is sent both ways simultaneously down single cables. (Two cables are actually required, but each behaves serially.) [2]

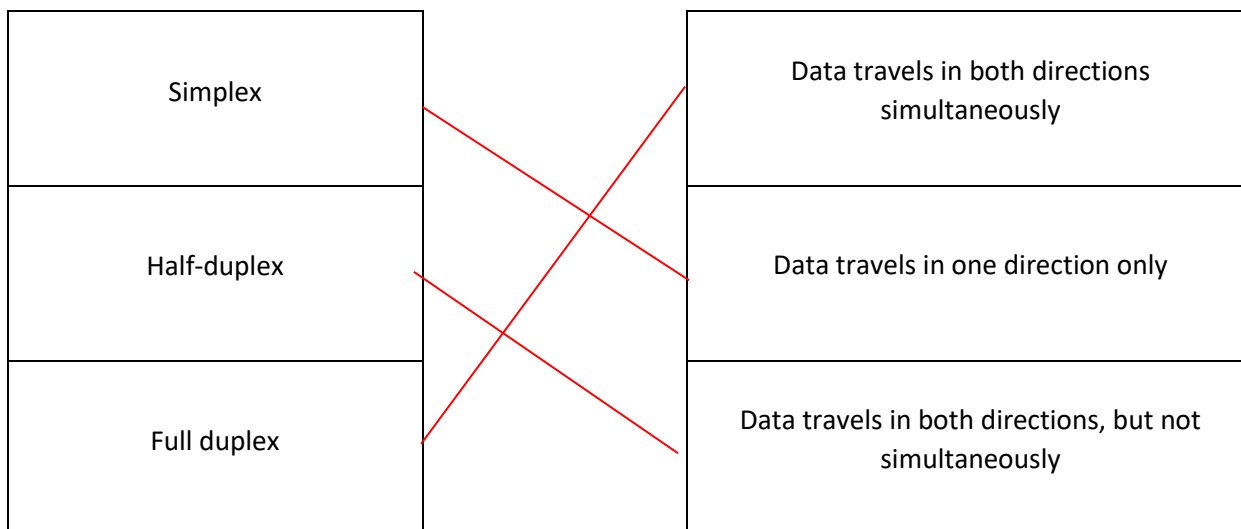
Parallel, half-duplex transmission: Data is sent, several bits at a time, down multiple wires, and can be sent back, but not simultaneously. [2]

Serial, simplex transmission: Data is sent down a single cable in one direction only. [2]

Homework 1 Data transmission

1. Javid is looking to set up a home network and is becoming puzzled by some of the data transmission terminology.

- a. Draw a line to match each description to the appropriate technical term. [3]



- b. Give one common use for each type of transmission and suggest one reason why it is appropriate: [6]

Simplex transmission: Used for keyboard to CPU data transmission where data is never required to be sent from the CPU back to the printer.

Half-duplex transmission: Printer cables used primarily for sending data one way, but also for message sent back from the printer.

Full duplex transmission: Fibre optic networking and Internet cables where upload and download are equally important.

2. Data can be transmitted in serial or parallel. Explain serial and parallel and give one disadvantage of parallel transmission. [3]

Serial involves all bits travelling down a single wire. Parallel has multiple wires with up to 32 bits travelling simultaneously down each wire.

Parallel wires all have different properties which affect the speed at which signals (bits) travel. This means each bit arrives out of sync and is known as 'skew'.

Parallel wires can only be used over very short distances.

Interference between parallel wires can cause 'crosstalk' resulting in corruption of the data.

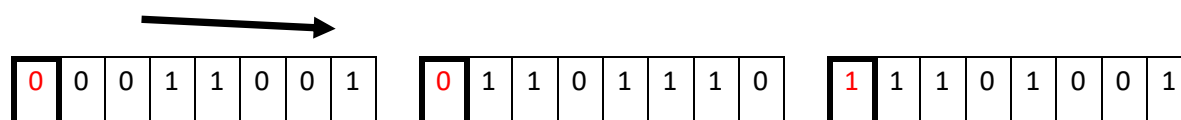
Worksheet 2 Error checking

Task 1

1. Using a barcode on the back of a book, calculate the check digit using the Modulo 10 system.

ISBN													
Weight	1	3	1	3	1	3	1	3	1	3	1	3	
Multiplication													
Addition	Add all the numbers												
Remainder	Find the remainder when divided by 10												
Subtraction	Subtract the result from 10												

2. The following three bytes are transmitted across a Serial interface using odd parity. Insert the parity bits for each byte that is transmitted.



Task 2

The Luhn algorithm was devised as a checksum formula to ensure credit card numbers are valid when manually or automatically entered into a machine.

The steps in the algorithm are as follows:

Credit Card Number	4	3	6	2	6	2	6	8	7	7	4	3	3	1	1	6	
Double every other number	8		12		12		12		14		8		6		2		
Subtract 9 if number > 9			3		3		3		5								
Find sum of all digits	8	3	3	2	3	2	3	8	5	7	8	3	6	1	2	6	70

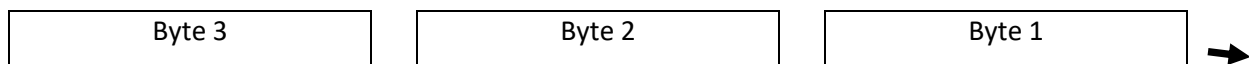
If the sum of all digits is a number divisible by 10, the number will be accepted. If not, it is rejected assuming an error in input.

1. Would the following credit card number be accepted? Show your working. **Yes**

Credit Card Number	4	4	7	4	8	5	2	4	6	6	7	8	5	4	8	5	
Double every other number	8		14		16		4		12		14		10		16		
Subtract 9 if number > 9			5		7				3		5		1		7		
Find sum of all digits	8	4	5	4	7	5	4	4	3	6	5	8	1	4	7	5	80

Homework 2 Error checking

1. The ASCII codes for J and K are 1001010 and 1001011 respectively.
 - a. In an even parity system, what would be the value of the parity bit for the characters J and K? [2]
1 and 0.
 - b. Characters L, M and N are transmitted using odd parity. The parity bits are indicated within the bold border. Part of the transmission was corrupted by interference. Which of these bytes would fail the parity check?



0	1	0	0	1	1	0	0
---	---	---	---	---	---	---	---

1	1	0	0	1	1	0	1
---	---	---	---	---	---	---	---

0	1	0	0	1	1	1	0
---	---	---	---	---	---	---	---

Byte 1 would fail.

[1]

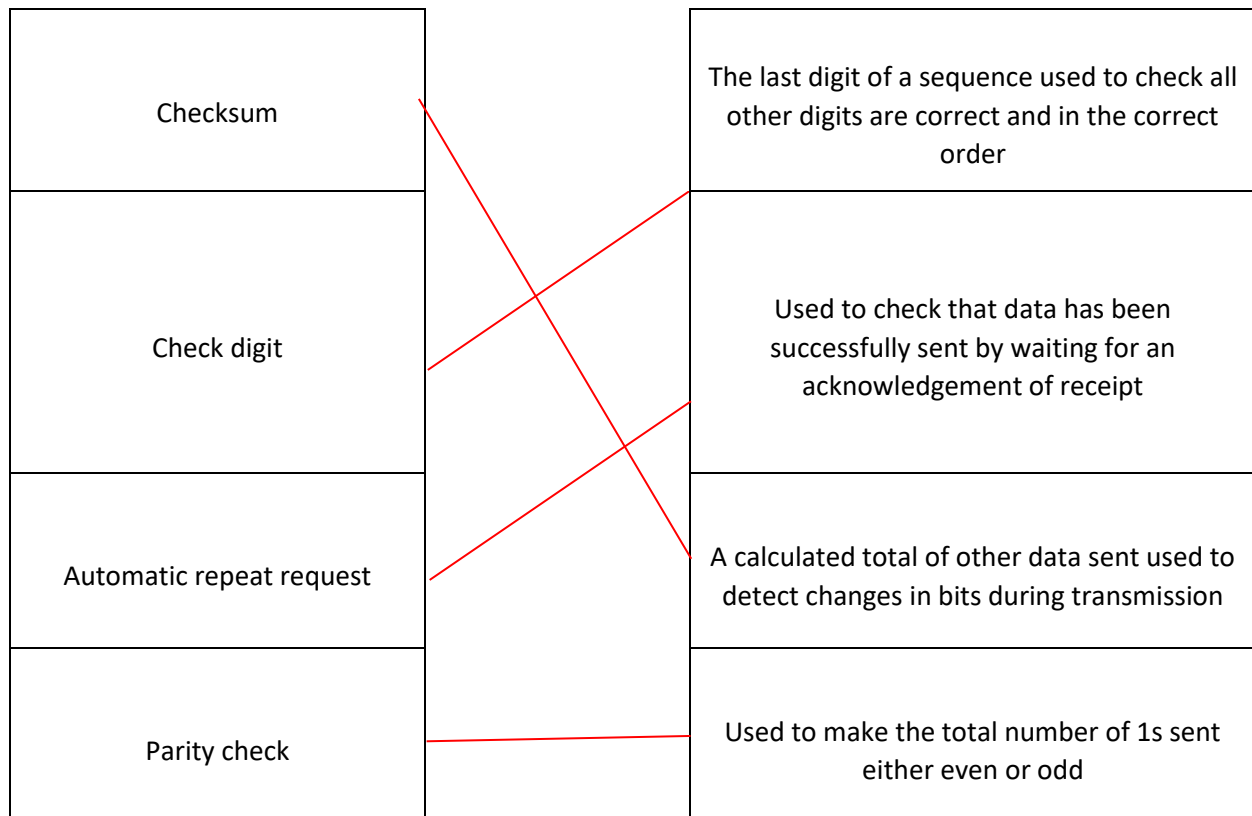
2. What would the computer system do to correct this transmission error?

[1]

Request the sending computer to resend the byte.

2. Draw a line to match each file type to its appropriate description.

[4]



3. An internet protocol uses a checksum algorithm to ensure that the data within each data packet is received without error.

a. The check sum is calculated by adding the value of each byte, dividing by 255 and taking the remainder.

Calculate the checksum value in binary for the following transmission: Show your working.

Byte 3							
0	0	1	0	0	1	0	1

Byte 2							
0	0	0	1	0	1	0	1

Byte 1							
1	1	0	1	1	0	1	0

Bytes 1-3 equal 218, 21, and 37 respectively. Total = 276, remainder (checksum) = 21.

Binary value = 00010101.

[5]

b. A check digit is a type of checksum. Suggest two uses of check digits.

[2]

Barcode numbers (EAN or UPC)

ISBN numbers

Credit card numbers

Bank account numbers

Vehicle Identification Numbers (VIN)

Tax and Social ID numbers.

Worksheet 3 Introduction to the Internet

Task 1

1. What are the dangers of getting information on health-related issues from the Internet?

The information may be highly inaccurate or even harmful. Much depends on who posted the information and whether they have anything to gain from it.

2. Perform two searches on Google or another Search Engine using the following search terms:

(a) Vaccine danger

(b) Vaccine safety

(a) Looking up "vaccine danger" produces, typically a result like the following from <http://educate-yourself.org/contactus/>

By Ken Adachi, [Editor](#)

<http://educate-yourself.org/vcd/index.shtml>

The dangers of vaccinations to your child's long term health prospects and longevity itself far outweigh any potential benefits touted by the pharmaceutical industry for vaccines. The LIES and misinformation about vaccine benefits from the drug industry is voluminous, overwhelming, and statistically provable. Don't allow your child to go on the chopping block for these Liars and their profit margins. They aren't working for you, they're servants of the corporate elite/Illuminati and the Illuminati has a surreptitious [population reduction agenda in place](#).

Just say NO!

Tell the doctor, tell the clinic, tell the school, tell the nurse, tell the employer, tell the government bureaucrats, tell the health department, or anybody else who is trying to force you or your kids to take vaccines against your will.... "because you must take them", Tell them... NO.

No matter WHAT they say or threaten you with, tell themNO.

(b) Typing in “vaccine safety” produces typically a page written by one of many more reputable organisations, such as <http://www.whyichoose.org/vaccinesafety.html>

Vaccine Safety Facts for Parents

As a parent, you want to make the best decisions to protect your child—staying informed helps. Your questions are important and you deserve reliable information to support your decisions. If you want to learn more, ask your doctor for a “consultation visit,” or check out our resources.

Are Vaccines Safe?

Yes. Vaccines are safe. In fact, experts including American Academy of Pediatrics, the Institute of Medicine, and the World Health Organization agree that vaccines are even safer than vitamins. Millions of children and adults are vaccinated every year—safely. Thousands of people take part in clinical trials to test a vaccine before it is licensed by the Food and Drug Administration (FDA). After it’s licensed, the Vaccine Adverse Events Reporting System (VAERS) helps track any health effect that happens hours, days, weeks, or even months later. Anyone can report a possible side-effect so that it can be studied. This monitoring helps ensure vaccines are safe. To learn more about vaccine safety from the Centers for Disease Control and Prevention, visit the [CDC vaccine safety](#) page.

3. Try typing in “Inaccurate information about ...” to find another example of inaccurate or misleading information given about health topics, such as infant health, diet, sleep requirements, acne or any topic that interests you.

There are many examples.

The website <http://www.elsevier.com/about/press-releases/research-and-journals/google-it-internet-searches-often-provide-inaccurate-information-about-infant-sleep-safety>

The website <http://blogs.scientificamerican.com/guest-blog/accuracy-of-medical-information-on-the-internet/>

Diet – much of the information given is misleading. See for example

<http://www.bbc.co.uk/news/health-14882832>

“Diets fail because advice is wrong, say researchers”

<http://authoritynutrition.com/11-biggest-lies-of-mainstream-nutrition/>

Is this information accurate?

Task 2

4. Try using www.duckduckgo.com and www.google.com to find the answer to the question “how much sleep does a teenager need per night?”

- (a) Do the two sites give the same answer? If not, what are the differences?

The two sites may give slightly different answers

- (b) What are the advantages of using a smaller search engine like duckduckgo, if any?

duckduckgo guarantees not to collect or sell any personal information

It may not have so many irrelevant sites

- (c) What are the likely differences between information found in an encyclopedia and information found on the Internet?

Information in an encyclopedia will have been written by experts and carefully reviewed and edited. However, it may quickly become out of date.

Anyone can post information on the Internet and there is no check on its accuracy or truth.

Homework 3: Introduction to the Internet

1. Tick a column to show whether the following statements are true or false: [5]

	True	False
More than 2 billion people worldwide use the Internet	<input type="checkbox"/>	<input type="checkbox"/>
The Internet is the same as the World Wide Web	<input type="checkbox"/>	<input type="checkbox"/>
Google stores information on millions of Internet searches and who made them, every day	<input type="checkbox"/>	<input type="checkbox"/>
Pets, wild animals, cars and mobile phones can all be tracked via the Internet	<input type="checkbox"/>	<input type="checkbox"/>
Anyone can post information on the Internet	<input type="checkbox"/>	<input type="checkbox"/>

2. (a) What software would you use to look at a particular website? [1]

Browser software (NOT Google, Yahoo etc – no brand names)

- (b) What software would you use to find information about a particular topic? [1]

A Search Engine

- (c) List **two** advantages of using the Internet to find information [2]

(i) Very fast to find information on almost any subject

(ii) Information available 24 hours a day

other reasonable answers

- (d) List **two** disadvantages of using the Internet to find information. [2]

May be biased, inaccurate, out of date

Data about your search may be stored by Google and sold to advertisers

3. Give **three** advantages and **one** disadvantage of Internet banking. [4]

advantage (i) Available 24 hours a day

advantage (ii) No need to queue

advantage (iii) Can do it from home without the need to travel to a bank

disadvantage Account may be vulnerable to hackers

Worksheet 4 The Internet

1. IP addresses

All web addresses (URLs) have a corresponding IP address, held on a domain name server (DNS).

Use a website such as <http://www.who.is> to find out the missing IP addresses and domain names, and where the domain name server is located.

Domain name or Host name	IP address	Location
www.google.co.uk	173.194.34.95	United States
(Your school website)		
Amazon	178.236.6.251	Ireland
bbc.co.uk	212.58.246.91	London
The computer you are working on		
Your neighbour's computer		

2. True or false?

	True	False
A PC must connect to a router to access the Internet	X	
The job of a router is to read the address on a data packet and send it on its way via the best route to its destination	X	
Every device in the world connected to the Internet has an IP address	X	
The IP address of a device depends on its geographical location	X	
You connect to the Internet via an Internet Service Provider (ISP)	X	
A protocol is an error checking procedure		X
HTTPS is a secure protocol which encrypts information before transmitting it	X	
The MAC address of a computer may change if the computer is moved to a different location		X

Homework 4: The Internet

1. Tick a column to show whether the following statements are true or false:

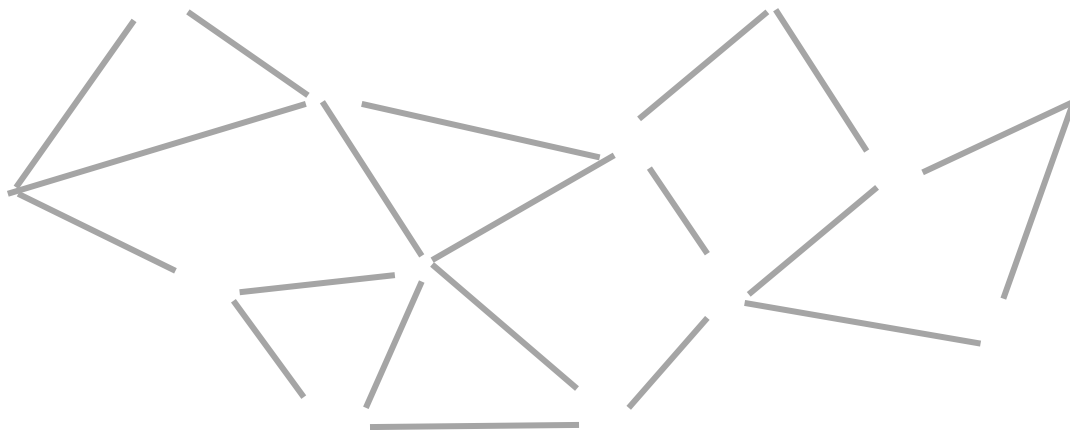
[5]

	True	False
The Internet is part of the World Wide Web		✓
Each household in the world has a unique IP address		✓
The IP address of a laptop will change as you travel to different places	✓	
Every networked device in the world has a unique MAC (Media Access Control) address	✓	
To use the Internet, you must be connected to a router, either by cable or using a wireless connection	✓	
An Internet cookie is a type of virus		✓

2. (a) Explain with the aid of a diagram the concept of a **packet switching network**.

[5]

Data transmitted over the Internet is divided up into packets of data (e.g. 512 bytes per packet). Each packet is sent independently to its destination via other networks on its route. The router at each node decides which route a packet should take on the next leg of its journey.



- (b) Name two items of information that each data packet will contain.

[2]

IP address of sender, IP address of recipient, total number of packets in transmission, sequence number of packet

3. (a) What is a protocol? [1]

A set of rules

- (b) Name a protocol used to transfer data across the Internet. [1]

IP, TCP/IP, HTTP, HTTPS

4. A DNS (Domain Name System) translates domain names such as www.bbc.co.uk, into numerical IP addresses, such as 212.58.241.67.

- (a) List two advantages of the Domain Name System [2]

It is easier for a human to remember a name than a series of numbers

If the IP address changes, the domain name does not have to change

- (b) A user types the web address www.bbc.co.uk into a web browser.

Describe how a DNS server is used to access this website. [4]

DNS servers have a database of addresses, constantly updated by other DNS servers

When you request a website address, the DNS server looks up the address and translates it to an IP address. If it does not have the address in its database, it passes it up the hierarchy to another DNS server until it is found. If it can't be found an error message is sent to the user.

Worksheet 5: Security aspects

Task 1 Viruses

Juan is concerned about viruses. Define what is meant by a virus:

A virus is a malicious, self-replicating piece of code that attaches itself to other files and programs on your computer.
[2]

The table below contains a dictionary segment from an antivirus program

Date of update	Suspect malicious code
Jan 4 th	del %SYSTEMROOT%
Jan 18 th	start /w wscript.exe
April 10 th	colCDROMs.Item(i).Eject
May 27 th	-s -t 10 -c
June 3 rd	Set oWMP = CreateObject("WMPlayer.OCX.7")

Juan last updated his antivirus on May 25th. Examine the code samples below in files on Juan's computer and state whether or not his antivirus would find them.

Sample 1:

```
echo Deleting Critical System Files... echo del *.*  
start /w wscript.exe C:sleep3000.vbs  
echo Deletion
```

This would be detected. [1]

Sample 2:

```
echo Deletion start /w rampage.exe C:rage2000.bat  
echo del %SYSTEMROOT%  
echo Creating Directory h4x...  
cd C:Documents and Settings  
mkdir h4x
```

This would be detected. [1]

Sample 3:

```
char inputFile[]="C:\\rawr.exe";  
ofstream fp("CLICK.bat", ios::app);  
system("START CLICK.bat");  
while (!input.eof())  
input.getline(buffer,255);  
system("call shutdown.exe -S");
```

This would not be detected as the antivirus has not had its dictionary updated with this suspect code. However, does detect the earlier virus. [1]

Sample 4:

```
echo Responding  
start /w wscript.exe C:sleep2000.ggp  
pause  
shutdown -s -t 10 -c -
```

This would not be detected because the virus checker had not been updated after the malicious code was recognised by the antivirus software and added to its dictionary. [1]

Task 2 Hacking and cracking

1. Explain the difference between hacking and cracking.

Hacking is gaining access to programs or data through unauthorised or unintended means. Cracking is illegally changing manufacturer source code to gain access to programs or services, or to make it perform in ways other than intended. [2]

2. Which of the following would constitute hacking?

Activity	Hacking or not?
Using your brother's password to look at their Facebook account and remove photos of yourself	Hacking unless you have permission from your brother.
Guessing the default password 1234 for a mobile phone voicemail system to listen to someone else's messages	Hacking. Recent newspaper scandal in the UK where reporters are said to have gained information from the mobile phones of famous individuals.
Using a backdoor with no password required, provided by a Trojan planted on another person's computer	Hacking.

Breaking into a computer system simply to prove it can be done and leaving without trace	Hacking.
Gaining authorised access to customer data at work and passing it to another company who intend to sell it	Not hacking, but still illegal data theft.
Breaking into a company network connection remotely to damage files and make others impossible for company employees to access unless a payment is made to 'unlock' them	Hacking with a further criminal intent.

[6]

3. Black hat hackers are those who illegally hack into computer systems, with or without a further criminal intent. White hat hackers are those who companies employ to deliberately find vulnerabilities in their own security and fix them before a black hat hacker can exploit any security flaw.

a) Who are grey hat hackers?

People who systematically target company security to find flaws, then make themselves known to the companies and ask for payment in return to fix the problems they find. They have the intent of a white hat hacker, but lack any permission to hack into the systems in the first place.

[2]

b) Is this behaviour of white or grey hat hackers illegal or unethical?

Hacking, without permission is illegal. Rarely, however, would companies prosecute. Grey hat hackers take advantage of this and offer to fix the problem, without divulging the details of the flaw, in return for payment.

White hat hackers are sometimes referred to as ethical hackers. Grey hat hackers are usually regarded as unethical since they are only doing it for personal gain, at the expense of others. Their demands can also be construed as ransom, even if this is not their intent.

[2]

Task 3 Hacking

Visit: <http://www.bbc.co.uk/news/technology-32844123> and discuss the article.

Questions could be asked, such as:

1. What were Egor's intentions?
2. Does it matter that Egor was deliberately hacking the site to find a flaw or not?
3. Should Starbucks be angry?
4. Would Egor be considered a black, grey or white hat hacker?

[4]

Homework 5: Security aspects

1. (a) Suggest and briefly describe **four** different security issues that should be considered when installing a wireless network connection to the Internet. [8]

Viruses – self-replicating code that attaches itself to programs

Spyware – keylogging software that covertly gathers and reports your online activities.

Adware – Irritating software that causes pop-up advertisements to appear in a browser

Worms – Standalone file that does not need a host program to attach itself to

Trojan – Non-self-replicating virus that masquerades as an innocent file

Hacking – Unauthorised access to the network

War driving – Using an unsecured Internet connection

Other answers may include pharming, phishing and cookies.

- (b) Explain what is incorrect with the following three statements. [3]

“I back up my data in case I catch a virus.”

Backing up data may cause an existing virus to be backed up too.

“A good antivirus package will always find a virus on my computer.”

Antivirus packages will only find viruses that have been added to their dictionary, and then will only be effective if your own package has been updated since it was added.

“A complex wifi password will prevent all unauthorised access from hackers.”

A complex password will prevent opportunistic hackers, but Trojans and other malware can provide backdoors into computers that don't require a password.

4. Omar is confused with the following terminology used to describe hackers and crackers.

Cracker

White hat hacker

Grey hat hacker

Black hat hacker

Complete sentences below with the correct terms. [4]

A **black hat hacker** gains unauthorised access to software and systems, usually with a further criminal intent. A **white hat hacker** is employed by an organisation to find and fix holes in their systems that others could exploit. A **grey hat hacker** gains unauthorised access, but then offers to fix the holes they find for a fee. A **Cracker** is someone who illegally modifies program source code to alter its behaviour.

HTML Reference Sheet

Tag	What it defines	Example	Usage
<code><!--...--></code>	A comment	<code><!-- This is a comment --></code>	Use comments to explain your HTML code
<code><!DOCTYPE PE></code>	The document type	<code><!DOCTYPE html></code>	This must be the first line in your HTML document. It has no closing tag.
<code><a></code>	A hyperlink	<code>Australian Tourism</code>	The most important attribute of the <code><a></code> element is the href attribute, which indicates the link's destination.
<code><body></code>	The document's body	<code><body> (content) </body></code>	The <code><body></code> element contains all the contents of an HTML document, such as text, hyperlinks, images, etc.
<code>
</code>	Line break	<code>
</code>	This tag has no closing tag
<code><div></code>	A section in the document	<code><div id="container"><h1>SEE AMAZING SCENERY</h1> </div></code>	The <code><div></code> element is usually used with CSS to lay out a web page
<code></code>	Emphasised text	<code>Get free information and travel tips</code>	Text will be displayed as italic in most browsers.
<code><form></code>	An HTML form for user input	<code><form id="subscribe-form"> <p> <label for="Firstname">Firstname: </label> <input type="text" name="firstname"> </p></code>	The <code><form></code> element can contain form elements such as <code><label></code> and <code><input></code>
<code><h1> to <h6></code>	HTML headings	<code><h1>This is heading 1</h1> <h2>This is heading 2</h2></code>	h1 to h6 have default sizes, which you can change if you need to. Use only for headings – not just to make text large or bold.
<code><head></code>	A container for all the head elements	<code><html> <head><title>New Zealand</title> </head></code>	The <code><head></code> element must include a title for the document and can include styles and scripts.
<code><hr></code>	Draws a horizontal line	<code><hr></code>	Use to separate two parts of the text or separate topics
<code><html></code>	Tells the browser that this is an HTML document	<code><!DOCTYPE html> <html></code>	Place under <code><!DOCTYPE html></code> , above <code><head></code>
<code></code>	An image	<code></code>	Use to place an image
<code><p></code>	A paragraph	<code><p>Explore the lakes of New Zealand</p></code>	Browsers automatically add some space before and after each <code><p></code> element. <code><p></code> tags are used for the content of a web page
<code></code>	Emphasised text	<code>Book your flight now!</code>	Will be displayed as bold in most browsers
<code><style></code>	Style information for a document	<code><style>body {background-color: grey;} h1 {color: white; font-size: 24pt;} </style></code>	<code><style></code> is written in the <code><head></code> section and defines all the styles for the document

<title>	A title for the document	<title>New Zealand</title>	The title is displayed at the top of the window
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CSS Property	Description	Example	Usage
/* */	A CSS comment	/* This is a comment */	Use comments to explain your CSS code
Background and dimension properties			
background-color	Sets the background colour of an element such as body, p or an id selector e.g. #header	p{background-color: #0000FF;} #header{ background-color:gray}	The colour can be defined by name or in hexadecimal, e.g. blue=#0000FF
width	Sets the width of an element (height sets height)	#container{width=100%;}	Using a percentage instead of an absolute width makes the web page responsive
max-width	Sets the maximum width of an element (see also max-height, min-height, min-width)	#container{max-width: 800px;}	However wide the screen the element will never be wider than 800px
Font properties			
font-family	Specifies the font-family for text	Body{font-family: Arial, Verdana, sans-serif;}	If the browser does not support the first font listed, it tries the second, then the third etc.
font-size	Specifies the font size for text	p{font-size: 200%;}	The font is set to twice the default size for p
font	Specifies all the font properties in one declaration	p{font: italic 20px arial,sans-serif}	Can set font size in px or pt (pt size is larger than px)
color	Specifies the font color	p{color: lightblue;}	Can also use hex codes for color: color: #ccff00;
Margin, border and padding properties			
margin	Sets all the margin properties in one declaration (left, right, top, bottom) in px, pt, cm etc.	h2{margin:20px} #container{margin: auto;}	The margin defines the space outside a border; it is completely transparent. auto gives a default margin
border	Sets all the border properties in one declaration. (border-width, border-style and border-color)	h1{border:5px solid gray;} body{dotted black;}	It does not matter if one of the values is missing.
padding	Sets all the padding properties in one declaration	#navbar{padding: 5px;}	Defines the space round the content inside a border
Positioning properties			
float	Lets an element float to the left or right	img {float:right;}	Use this to position an image to the right of text
Text properties			
color	Sets the colour of text	h1{color: white; font-size: 24pt;} a:link{color: #0000FF;}	The colour can be defined by name or in hexadecimal, e.g. #0000FF is blue
text-align	Specifies horizontal alignment	p{text-align: center;}	Use this to align text left, right or centre

Relevant Quizlet Flashcards

Join my GCSE Team

<https://quizlet.com/join/rd4VKwq6F>

My GCSE CS Folder

<https://quizlet.com/myranT/folders/igcse-cs/sets>

Separate Quizlets

<https://quizlet.com/vn/520861483/123-internet-principles-flash-cards/>

<https://quizlet.com/vn/520861550/122-14-security-flash-cards/>

<https://quizlet.com/vn/520861552/121-data-transmission-flash-cards/>

<https://quizlet.com/vn/520861313/igcse-cs-112-hexadecimal-flash-cards/>

<https://quizlet.com/vn/520861395/igcse-cs-113-data-storage-flash-cards/>

<https://quizlet.com/vn/520861080/111-binary-number-system-flash-cards/>

<https://quizlet.com/vn/513056355/data-representation-binary-gcse-flash-cards/>