OCR
RECOGNISING ACHIEVEMENT

GCSE

ADDITIONAL APPLIED SCIENCE A

AP5 Communications

Specimen Paper

Candidates answer on the question paper:
Additional materials: ruler (cm/mm), calculator

H

A326/02

45 mins

Candidate Name	

Centre Number						Candidate Number				

TIME 45 mins

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above.
- Answer **all** the questions.
- Write your answers on the dotted lines unless the question says otherwise.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- There is a space after most questions. Use it to do your working. In many questions marks will be given for a correct method even if the answer is incorrect.
- Do not write in the bar code. Do not write in the grey area between the pages.
- DO NOT WRITE IN THE AREA OUTSIDE THE BOX BORDERING EACH PAGE. ANY WRITING IN THIS AREA WILL NOT BE MARKED.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [ ] at the end of each question or part question.
- The total number of marks for this paper is **36.**

This specimen paper consists of 19 printed pages.

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Answer all questions.

1.   In 1822 Louise Braille invented a code for communicating with blind people.

In this code, each letter of the alphabet is represented by a different pattern of raised bumps on a surface. The bumps are arranged in three rows of two, as shown below.
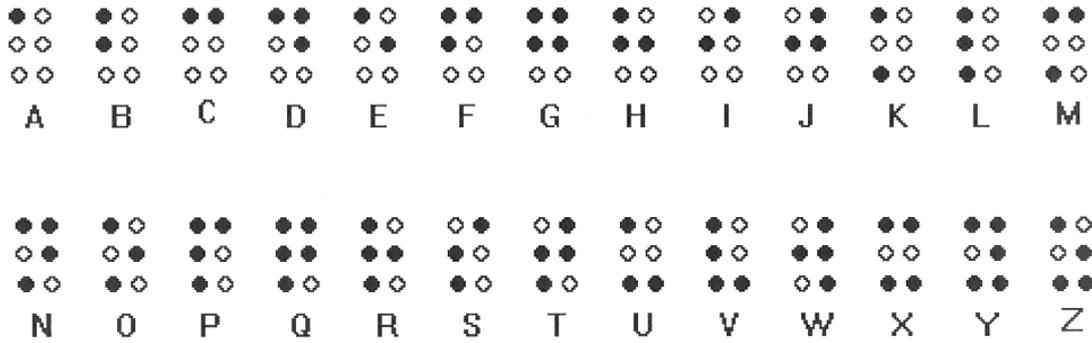
(a) Braille's code is an example of a **digital** code.

Describe the difference between an analogue code and a digital code.

....

....

....[2]

(b) **(i)** Name another example of a code used in communications.

....[1]

(ii) Explain how your example of a code works.

....

....

....

....[2]

[Total: 5]

2. Max buys and sells cars.

He needs to buy a mobile phone which can transmit and receive pictures of cars. He narrows the choice to just two models. They each cost £250.

Model	RGB4096	BGW16384
Display	Full colour, 41mm x 34mm	Black, grey and white, 41mm x 34mm
Screen	4,096 pixels	16,384 pixels
Battery Lifetime	5 hours	20 hours
Weight	1.1 N	0.9 N
Size	102mm x 48mm x 23mm	90mm x 42mm x 21mm
Speed	1.2 s per picture	0.9 s per picture

Microsoft ©

Max will use the phones to send pictures of cars to customers.

(a) The two phones have different speeds. Does this really matter? Give a reason.

....

....[1]

(b) Suggest **two** important differences between the phones.

1. ....

2. ....[2]

(c) Suggest which phone Max should buy. Give reasons for your choice.

....

....

....

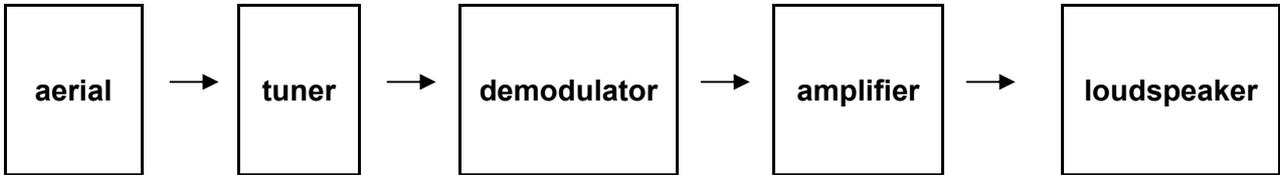...[2]

[Total: 5]

3. Sam has a radio which receives stations in the FM band.

Here is the block diagram for his radio receiver.

| aerial | → | tuner | → | demodulator | → | amplifier | → | loudspeaker |

(a) Sam tunes his radio to receive broadcasts from OCR FM on 123.4 MHz.

He does this by altering one of the blocks in his receiver.

Put a (ring) round the component which he alters.

[1]

(b) Sam finds that the signal-to-noise ratio for OCR FM is low.

How can he tell that he has a low signal-to-noise ratio?

....

....

....[2]

(c) OCR FM uses frequency modulation to put information onto its carrier frequency of 123.4 MHz.

Explain what is meant by **frequency modulation**.

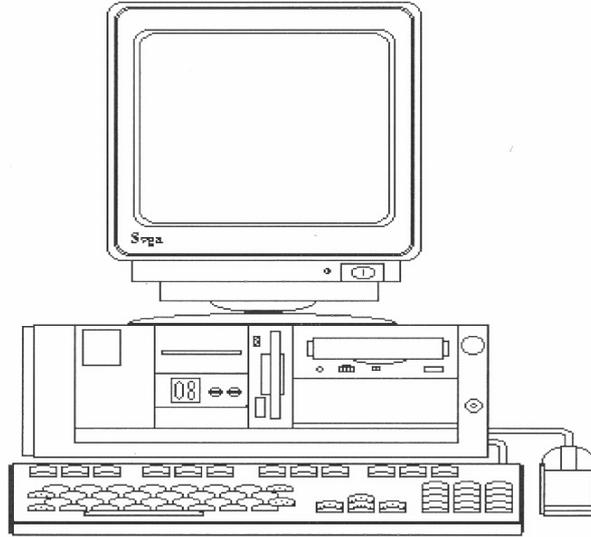Draw a sketch graph of a frequency modulated carrier wave.

....

....

....[2]

[Total: 5]

4. The modem in Sandy's computer has stopped working.

She decides to install a new modem card in the computer.

(a) Before she opens the case, Sandy connects the computer to the mains supply through an earth leakage device.

How will the earth leakage device make the computer safer for Sandy?

....

....[1]

(b) The new modem card has some switches on it.

Sandy uses these to set the speed of the modem.

She chooses a slow speed of 4800 bits per second because her telephone link has a small bandwidth.

Explain what is meant by the term **bandwidth**.

....

....[1]

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(c) Sandy tests her modem by downloading a file of music from a website.

The file arrives in a **compressed** format.

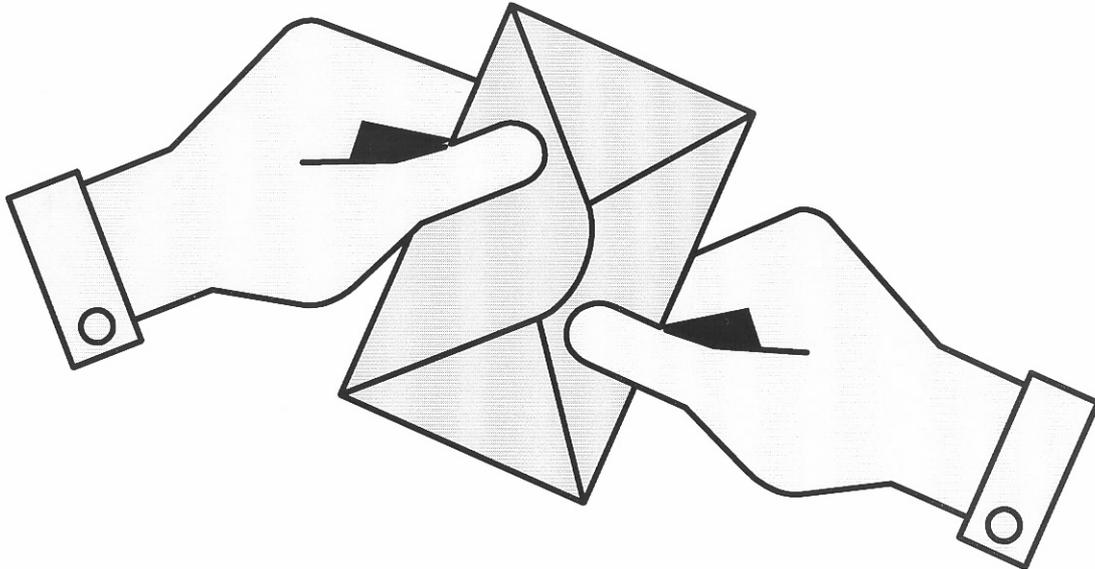State one advantage and one disadvantage of compressing the music file.

Advantage ....

....

Disadvantage ....

....[2]

[Total: 4]

5. The postal system allows people to exchange text messages over the whole world.

(a) Give your own example of an electronic communications system that people can use to exchange text messages with each other.

....[1]

(b) In the space below, draw a detailed block diagram for your example.

Label the links used to carry information between the blocks.

[3]

(c) Describe how your example transfers text messages from one person to another.

....

....

....

....

....[3]

(d) Explain how your example has changed people's lives.

....

....

....

....[2]

[Total: 9]

6. This question is about communications systems which use radio waves.

(a) Name your own example of a communication system which uses radio waves.

....[1]

(b) Communications systems can be represented with this block diagram.

| INPUT | → | PROCESSOR | → | OUTPUT |

(i) Name the **processor** for your example.

....[1]

(ii) Describe what your chosen processor does.

....[2]

(c) Suggest a typical frequency for the radio waves used by your example.

Include the unit for frequency.

....[2]

(d) Governments issue licenses for people to communicate by radio waves.

Explain why they do this.

....

....

....[2]

[Total: 8]

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GCSE

ADDITIONAL APPLIED SCIENCE A

AP5 Communications

Specimen Mark Scheme

Maximum mark for this paper is [36]

H   **A326/02**

45 mins

This specimen mark scheme consists of 3 printed pages.

Question Number	Answer	Max Mark
1(a)	digital codes have limited number of states (e.g. 1, 0)	**[1]**
	analogue codes have lots of different values (wtte)	**[1]**
1(b)i	any recognisable code e.g. Morse, semaphore, DAB, digital TV , AM radio, etc.	**[1]**
1(b)ii	what is being coded e.g. picture, sound, alphabet, number	**[1]**
	how it is represented e.g. 1s and Os, pits and flats, light or no light, etc.	**[1]**
	Total marks	**[5]**
2(a)	**any sensible reason e.g.:**	
	both times quite short	
	much less than time to set up shot	
	slower speed compensated by colour picture	**[1]**
2(b)	**any of the following, maximum [2]**	
	battery lifetime	
	pixels	
	display	**[2]**
2(c)	decision made by considering context backed by sensible arguments, **maximum [2] e.g.:**	
	colour is important for customer choice	
	large number of pixels gives clearer picture	
	long battery lifetime allows longer away from office	**[2]**
	Total marks	**[5]**
3(a)	tuner	**[1]**
3(b)	the sound (from the loudspeaker)	**[1]**
	contains noise (wtte)	**[1]**
3(c)	the information is used to alter the frequency of the carrier (wtte)	**[1]**
	sketch graph for FM with variable frequency and fixed amplitude	**[1]**
	Total marks	**[5]**
4(a)	cuts off supply if dangerous fault develops in the computer (wtte)	**[1]**
4(b)	range of frequencies needed to transmit the information (wtte)	**[1]**
4(c)	**advantage:** shorter time to download file / less memory required to store file	**[1]**
	disadvantage: some of the quality/information of the music is lost (wtte)	**[1]**
	Total marks	**[4]**

5(a)	e.g. Morse code, fax, mobile phone, email - must allow messages in form of alphabetic symbols	**[1]**
5(b)	inputs, outputs and processors shown clearly	**[1]**
	transmission links labelled appropriately e.g. cable, optic fibre, radio wave	**[1]**
	sufficient detail	**[1]**
5(c)	how text is made into an electronic signal (e.g. keyboard, scanner)	**[1]**
	how signal gets from sender to receiver (e.g. modulated current, radio wave)	**[1]**
	how text is displayed to receiver (e.g. printer, monitor, screen)	**[1]**
5(d)	specific nature of improvement in quality / quantity / distance / speed	**[1]**
	explanation	**[1]**
	Total marks	**[9]**

6(a)	e.g. walkie-talkie, mobile phone, TV - anything sensible	**[1]**
6(b)i	transmitter and receiver	**[1]**
6(b)ii	transmitter copies information onto radio wave (wtte)	**[1]**
	receiver converts information back into form suitable for output	**[1]**
6(c)	any unit of frequency e.g. Hz, kHz, MHz, GHz	**[1]**
	e.g. 1.5 - 0.5 MHz (MW), 90 - 100 MHz (FM), 500 MHz (TV), 10 GHz (mobiles)	**[1]**
6(d)	**any of the following, maximum [2]**	
	stop interference	
	caused by two people using the same frequency	
	to generate income	**[2]**
	Total marks	**[8]**
	Overall marks	**[36]**