OCR
RECOGNISING ACHIEVEMENT

F

GENERAL CERTIFICATE OF SECONDARY EDUCATION

TWENTY FIRST CENTURY SCIENCE ADDITIONAL APPLIED SCIENCE A

A326/01

Communications (Foundation Tier)

OCE/25581

Candidates answer on the question paper.
A calculator may be used for this paper.

OCR supplied materials:
None

Other materials required:
- Pencil
- Ruler (cm/mm)

Wednesday 26 January 2011
Afternoon

Duration: 45 minutes

A326/01

Candidate forename		Candidate surname	

Centre number						Candidate number				

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Answer **all** the questions.
- Do **not** write in the bar codes.

INFORMATION FOR CANDIDATES

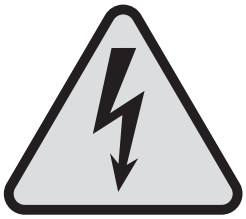
- The number of marks is given in brackets **[ ]** at the end of each question or part question.
- The total number of marks for this paper is **36**.
- This document consists of **12** pages. Any blank pages are indicated.

Answer **all** the questions.

1 Polly repairs radio transmitters for the police.

(a) Here are two of the safety signs near the bench where she works.

Draw a straight line from each sign to its meaning.



laser hazard

high voltage

emergency stop

[2]

(b) The transmitters which she repairs run off the mains electricity supply, not batteries.

(i) State the advantage of running the transmitter from the mains.

.....

..... **[1]**

(ii) The transmitters are connected to the mains supply when she repairs them.

This means that she might get an electric shock.

Put a tick (✓) in the box next to the feature which increases her safety when she repairs the circuit inside.

A plastic outer covering. ☐

A trip switch in the supply. ☐

An on-off switch on the front. ☐

[1]

(c) Police transmitters **encrypt** messages before they are sent out.

(i) Why are the messages **encrypted**?

.....

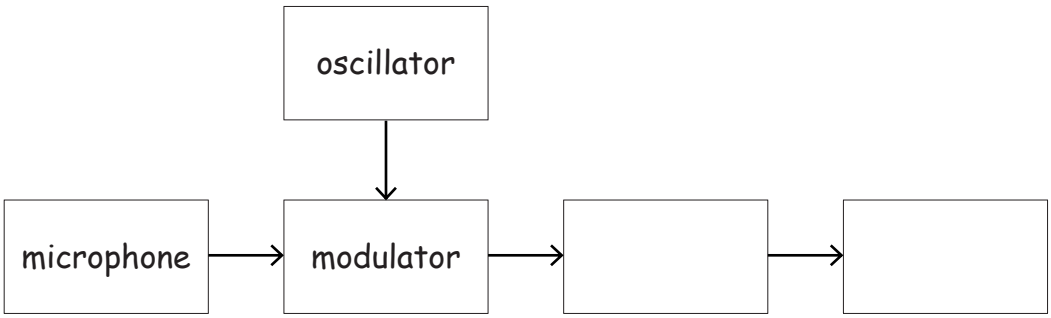
..... **[1]**

(ii) Give **another** example of a communications system which uses encryption.

.....

..... **[1]**

(d) Here is an incomplete block diagram for a radio **transmitter**.



(i) Complete the diagram.

Choose from these words.

aerial **amplifier** **receiver**

[2]

(ii) Complete the sentences about the transmitter.

Choose from these words.

decreases **encodes** **increases** **transmits**

The modulator …… information from the microphone onto the oscillator signal.

The amplifier …… the amplitude of the modulator signal. **[2]**

[Total: 10]

2 Jack and Jill live a long way apart. Jack communicates with Jill by telephone.

(a) Here is an incomplete block diagram for the telephone system.

(i) Complete the diagram. Use these words.

exchange **handset** **optical fibre**

[2]

(ii) The incomplete table shows what each part of the telephone system does.

input	processor	link	output
handset	exchange		

Complete the table. Choose words from this list.

exchange **handset** **optical fibre**

[1]

(b) The telephone allows long distance communication between people.

(i) Give **another** example of a long distance communication system.

.....

..... **[1]**

(ii) How does this long distance communication affect your everyday life?

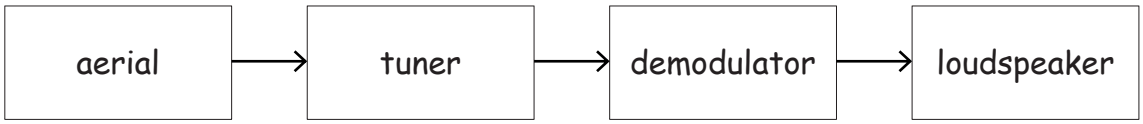
.....

.....

..... **[1]**

[Total: 5]

3 Here is a block diagram for a radio **receiver**.



(a) Draw straight lines to link the **start** of each sentence to its correct **end**.

start	end
The aerial…	…uses electricity to make sound.
The tuner…	…selects signals from just one channel.
The demodulator…	…turns radio waves into electrical signals.
The loudspeaker…	…extracts information from an electrical signal.

[3]

(b) The police use radio receivers to communicate with each other.

(i) Explain why police radio receivers are powered by batteries.

.....

..... **[1]**

(ii) Police radio transmitters use digital signals to send information.

This allows information to be encrypted.

Give two **other** advantages of using digital signals for police radios.

1 .....

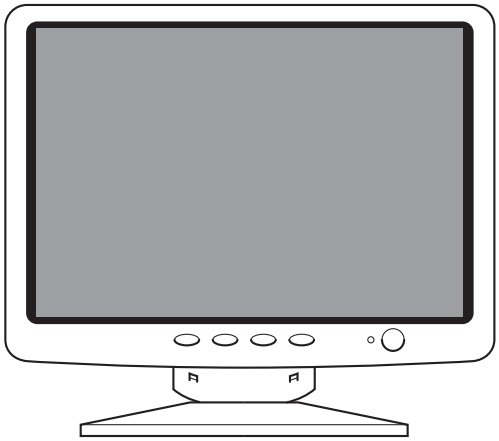
.....

2 .....

..... **[2]**

[Total: 6]

4 A computer monitor uses a stream of bits to generate a picture on a screen.



(a) Complete the sentences for a monitor. Choose the **best** words from this list.

circles **frames** **pixels** **squares** **rows** **words**

The dots which make the picture on the screen are called …… .

The dots are arranged in …… on the screen.

The refresh rate is the number of …… shown each second.

[3]

(b) One complete picture on the screen needs 16 000 **bits** of information.

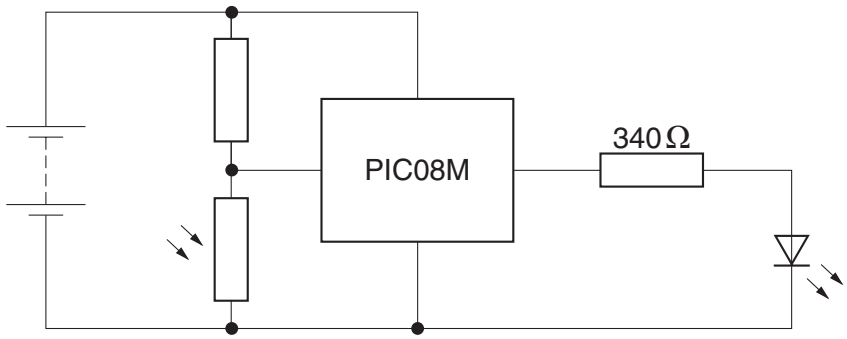
How many **bytes** is this? Put a (ring) around the answer.

2 000 **8 000** **32 000** **128 000**

[1]

[Total: 4]

5 Andy is testing this circuit.



(a) The circuit contains an LED.

Put a (ring) around the LED. **[1]**

(b) Andy measures the voltage across the 340 Ω resistor.

Describe how he should do this.

.....

.....

..... **[2]**

(c) Andy finds that the voltage across the 340 Ω resistor is 6.8 V.

Use $I = \frac{V}{R}$ to calculate the current in the resistor.

current = ... A **[1]**

(d) Andy calculates that the heating power of the resistor is 0.14 W.

Suggest why Andy needs to know the heating power of the resistor.

.....

..... **[1]**

(e) The PIC08M integrated circuit shown above is programmable.

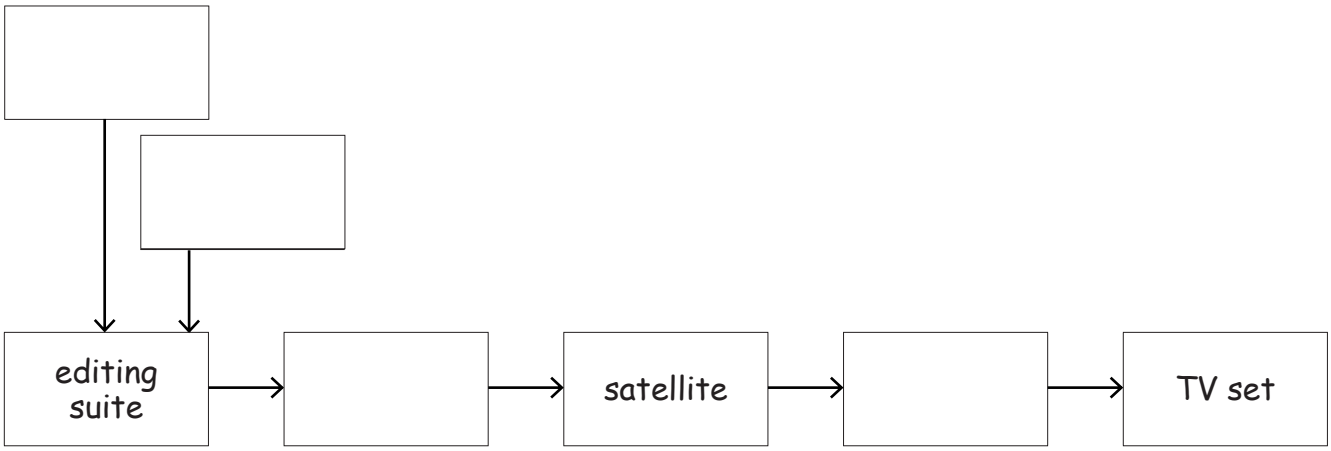
Explain why this reduces the cost of making the circuit.

.....

..... **[1]**

[Total: 6]

6 Here is an incomplete block diagram for a satellite TV system.



(a) Complete the block diagram. Choose from these words.

camera **loudspeaker** **microphone** **receiver** **transmitter**

[2]

(b) People who edit the TV programme work in the editing suite.

Suggest what these editors do to produce the final TV programme.

.....

.....

..... **[1]**

(c) Describe the best type of aerial for communicating with the satellite.

You can use a labelled diagram in your answer.

.....

.....

.....

[1]

(d) Put a (ring) around the most likely radio frequency used to communicate with the satellite.

10 Hz **10 kHz** **10 MHz** **10 GHz**

[1]

[Total: 5]

END OF QUESTION PAPER

PLEASE DO NOT WRITE ON THIS PAGE