

Wednesday 20 June 2012 – Morning

**GCSE TWENTY FIRST CENTURY SCIENCE
ADDITIONAL APPLIED SCIENCE A**

A326/02 Communications (Higher Tier)

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

Duration: 45 minutes

OCR supplied materials:
None

Other materials required:

- Pencil
- Ruler (cm/mm)



Candidate forename		Candidate surname	
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Centre number						Candidate number				
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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. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- 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).
- 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 Don likes listening to the radio.



(a) Draw lines to link each **part** of a radio receiver with its **function**.

part	function
tuner	input device
aerial	output device
amplifier	lets one station through
demodulator	increases amplitude of signal
loudspeaker	separates the signal from the carrier

[3]

(b) Don's favourite station is RadioOCR at 102.8MHz.

Give a reason why **only** RadioOCR is allowed to broadcast on that frequency in the UK.

.....

.....

..... [1]

(c) RadioOCR broadcasts using frequency modulation.

This gives a high quality sound for Don, with no distortion or hiss.

Give **another** example of an electronic technology which has improved the quality of communication and describe the difference it makes to people's lives.

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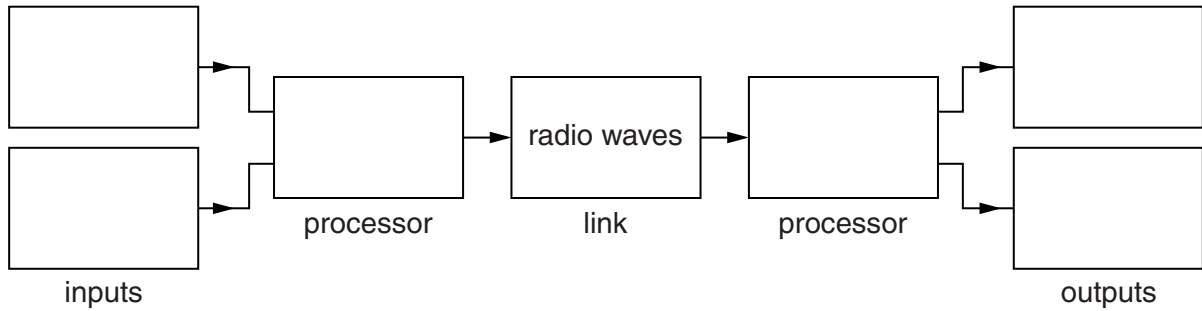
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..... [2]

[Total: 6]

2 Television is a part of many people's lives.

(a) Here is an incomplete block diagram for a simple television broadcasting system.



(i) Complete the block diagram. Choose words from this list.

camera loudspeaker microphone receiver screen transmitter

[3]

(ii) Which one of the blocks contains an **encoder**?

answer [1]

(b) How is the picture built up on the screen?

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

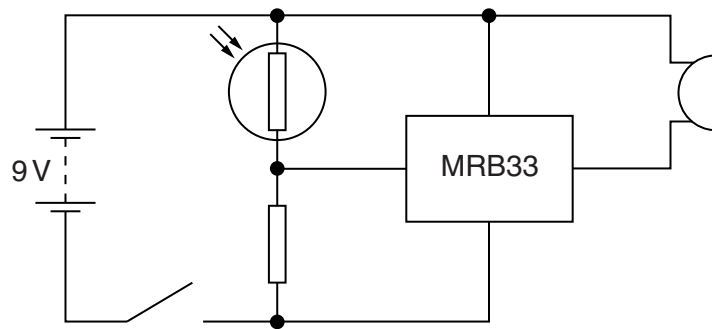
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Question 3 begins on page 6

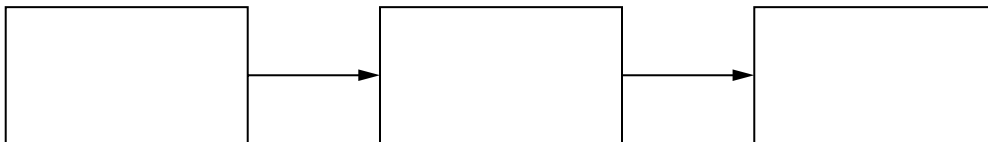
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3 Anne installs this theft alarm in the boot of her car.



The circuit senses the light each time the boot is opened. Ten seconds later, the alarm sounds.

(a) (i) Complete the block diagram below for the circuit above.



[3]

(ii) The block diagram contains arrows.

What do the arrows show?

.....

[1]

(b) Anne wants less sound out of the buzzer.

She finds this data for the buzzer.

output power	1.8W
frequency	2000Hz
voltage	9V

(i) She decides to check the voltage across the buzzer.

Draw on the circuit diagram above to show how she should do this.

Use the correct symbol for the voltmeter.

[1]

(ii) Calculate the current in the buzzer.

Use the rule $P = VI$.

current = A [1]

- (c) (i) Anne tries connecting a resistor to the buzzer to make it quieter.

She tests the arrangement with a switch and a 9V battery.

Draw a circuit diagram below to show her test circuit.

[1]

- (ii) The resistor reduces the voltage across the buzzer from 9V to just 3V.

What is the voltage across the **resistor**?

Put a **ring** around the correct answer.

3V

6V

9V

12V

[1]

[Total: 8]

4 Bert is a journalist. He uses a satellite telephone to talk to people in the office.



(a) The transmitter uses radio waves of frequency 6.0×10^9 Hz.

(i) Calculate the wavelength of the radio waves.

Use the rule $c = f\lambda$.

$$c = 3.0 \times 10^8 \text{ m/s}$$

wavelength = m [1]

(ii) Explain why the aperture of the transmitter dish needs to be much bigger than the wavelength of the radio waves sent to the satellite in orbit.

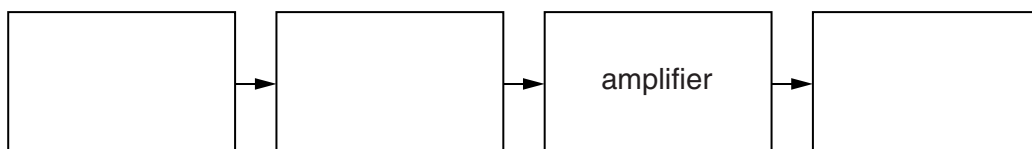
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..... [2]

(b) Here is an incomplete block diagram for the **transmitter** of the satellite telephone system.



Complete the block diagram.

[3]

(c) The satellite telephone system uses **digital** signals to carry information from Bert to his office. This means that Bert's signals can be compressed.

(i) Explain why it can be useful to compress signals.

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

(ii) Digital signals also result in a high value for the signal-to-noise ratio.

Explain why it is important to have a high value of **signal-to-noise ratio**.

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

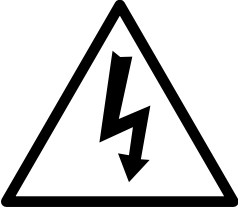
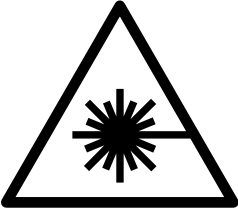

[Total: 10]

5 Felix's job is to repair amplifiers.

(a) He needs to know the meaning of hazard symbols.

Write down the meaning of these symbols.

The first one has been done for you.

symbol	meaning
	<p>Danger of electric shock</p>
	<p>.....</p> <p>.....</p>
	<p>.....</p> <p>.....</p>

[2]

(b) Felix repairs many amplifiers that use mains electricity.

Explain how using an **earth-leakage** device makes it safer for Felix to do repairs.

.....

.....

.....

..... [2]

(c) Some amplifiers use batteries instead of mains electricity.

(i) State **two** advantages of using batteries to power an amplifier.

1

2 [1]

(ii) State **two** disadvantages of using batteries to power an amplifier.

1

2 [2]

[Total: 7]

END OF QUESTION PAPER

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