

7 A house has a smart speaker that can take voice commands as input. A person in the house can tell the smart speaker to play music or audio books.

(a) The smart speaker cannot be described as a robot.

Explain why the smart speaker is **not** a robot.

[3]

(b) Identify the input device that allows voice commands to be used as input.

[1]

(c) The smart speaker has machine learning capabilities.

Explain how the smart speaker can use machine learning to improve the voice command input.

[4]

(d) The smart speaker is an example of an embedded system.

Explain why the smart speaker is an embedded system.

[2]

(e) The music and audio books that are played by the smart speaker are stored in cloud storage.

Give **two** advantages of storing the music and audio books in cloud storage.

1

2

[2]

(f) The data for the music and audio books needs to be checked for errors after being transmitted from the cloud.

(i) Explain how errors may occur in the data during transmission.

[2]

(ii) Give **two** error detection methods that could be used to check for errors in the data after transmission.

1

2

[2]

6 A computer game is programmed to use artificial intelligence (AI) to create the movements and actions of the computer-controlled characters in the game.

(a) Describe what is meant by AI.

[3]

(b) Explain how the AI can be used to improve the movements and actions of the computer-controlled characters.

[3]

(c) The computer game is programmed using a high-level language.

Explain **one** difference between a high-level language and a low-level language.

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..... [2]

(d) The programmer uses translators to translate the high-level language source code into machine code.

Identify the name of the translator that would be used for each of the statements. Each name may be used more than once.

(i) Translates and executes the source code one line at a time.

..... [1]

(ii) Translates the source code and will not execute it if errors are found. It instead produces a full report of the errors in the source code.

..... [1]

(iii) Translates the source code and produces an executable file.

..... [1]

(iv) Stops execution of the machine code where an error is found and will resume execution of the machine code once the error is fixed.

..... [1]

6 A search engine uses artificial intelligence (AI) to identify the most relevant web pages for the user.

(a) One characteristic of AI is the ability to learn.

Identify **three** other characteristics of AI.

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[3]

(b) The search engine uses machine learning.

Explain how machine learning is used by the search engine.

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[3]

9 A doctor's surgery has an expert system that helps diagnose the illnesses of its patients.

(a) Complete the paragraph about the operation of the expert system.

Use the terms from the list.

Some of the terms in the list will **not** be used. Some terms may be used more than once.

artificial binary central processing unit (CPU) data

inference engine interface knowledge base primary storage

process real read only memory (ROM) rule base

An expert system is a type of intelligence. The doctor will type data about the symptoms of the illness into the
The will decide which questions to ask the doctor. It will do this by linking the facts in the to the

The will decide on a diagnosis and this will be output on the

[7]

(b) The expert system has the ability to automatically adapt its own processes and data.

Give the name of this ability.

..... [1]

10 A business has a system that is described as having artificial intelligence (AI).

(a) State **one** of the main characteristics of an AI system.

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..... [1]

(b) An AI system is an expert system.

Explain how an expert system operates.

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..... [6]

9 One component of an expert system is the inference engine.

(a) Identify the **three** other components in an expert system.

- 1
- 2
- 3 [3]

(b) Describe the role of the inference engine in an expert system.

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..... [2]