



Name:

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Class:

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March 2023

6 (b) Describe what is meant by robotics.

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..... [2]

- (d) The robot needs to find its way through different puzzles. Each puzzle has a series of paths that the robot needs to follow to find its way to the end of the puzzle. The puzzle contains dead ends and obstacles, so the robot needs to decide which way to go.

The robot's program will use artificial intelligence (AI).

(i) Describe the characteristics of AI.

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..... [3]

(ii) Explain how the program will use AI.

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..... [4]

9 A company uses robots in its factory to manufacture large pieces of furniture.

(a) One characteristic of a robot is that it is programmable.

State **two** other characteristics of a robot.

1

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2

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[2]

(b) Give **two** advantages to company employees of using robots to manufacture large pieces of furniture.

1

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2

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[2]

(c) Give **one** disadvantage to the company's owners of using robots to manufacture large pieces of furniture.

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..... [1]

June 2023(2)

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]

June 2023 (3)

(b) Describe the role of the rule base in an expert system.

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..... [2]

November 2023 (2)

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]



- Explain how an expert system operates.

[6]

- (a)** The automated system uses a flow sensor.

Identify what a flow sensor measures.

..... [1]

- (b)** Explain **one** advantage to employees of using an automated system in manufacturing.

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[2]

- (c) Explain **one** disadvantage to the company owner of using an automated system in manufacturing.

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..... [2]

November 2023 (3)

- 10 A car repair garage uses an expert system.

- (a) Complete the description about the operation of the expert system.

Use the terms from the list. Some of the terms in the list will **not** be used.

inference engine interface knowledge base

machine learning mechanical engine output device

question base rule base

An expert system has a that contains a list of facts.

The applies the
to the to reach a diagnosis for the repair of the car.

The user provides data to the system using an

[5]



(b) The expert system has machine learning capabilities.

Describe what is meant by machine learning capabilities.

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..... [4]

June 2024 (11)

8 A farmer uses an automated robot to plant seeds in the field.

(a) State what is meant by the robot being automated.

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..... [1]

(d) Give **two** advantages of the farmer using an automated robot to plant seeds.

1

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2

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..... [2]



(e) Give **two** disadvantages of the farmer using an automated robot to plant seeds.

1

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[2]

(f) The robot is adapted to have machine learning capabilities.

Explain how this will improve the robot.

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[2]

June 2024 (12)

10 A garage uses an expert system to help diagnose any problems with cars that need repair.

(a) The expert system is an example of artificial intelligence (AI).

Describe what is meant by AI.

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[2]



- (b) A car has a problem with its braking system, so it is brought into the garage.

Explain how the expert system operates and how it is used to help diagnose the problem.

[5]

November 2024 (11)

- 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]

November 2024 (12)

8 A robot vacuum cleaner uses sensors to navigate around obstacles in a room.

(a) Tick (✓) **one** box to show which sensor would be the most suitable for this purpose.

- | | |
|--------------------|--------------------------|
| A proximity | ☐ |
| B flow | ☐ |
| C pressure | ☐ |
| D level | ☐ |

[1]

(b) An expert system can be used to diagnose an error with a robot vacuum cleaner.

Circle **three** components that are part of an expert system.

knowledge base	operating system	firewall
server	printer	actuator
	inference engine	
rule base	encryption	

[3]



(c) Explain how the robot vacuum cleaner can make use of machine learning.

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..... [3]

November 2024 (13)

5 A farmer has a plough that is an automated system. The plough is used to dig the ground in a field to prepare it for planting seeds.

The plough uses sensors and a microprocessor to maintain a straight line when digging the ground.

(a) State what is meant by an automated system.

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..... [1]

(b) Describe the role of the microprocessor in this process.

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..... [3]

(c) Give **two** benefits to the farmer of using an automated system for this purpose.

1

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[2]

(d) The plough uses artificial intelligence (AI) to navigate its way around the field.

Explain how the plough makes use of AI for this purpose.

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[4]

FM2025/12

(b) The search engine uses machine learning.

Explain how machine learning is used by the search engine.

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[3]



5 A hospital has computers and technology that it uses when caring for its patients.

(a) One computer is an expert system that is used to help diagnose a patient's illness.

The doctor inputs the patient's symptoms into an interface and a diagnosis is output.

Describe how the expert system decides the diagnosis.

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..... [3]

(b) The hospital has a robot that is used to perform surgery. A doctor controls the robot from a different location to perform surgery on a patient.

(i) One feature of the robot is that it has electrical components.

Give **two** examples of the electrical components of a robot.

1

2 [2]

(ii) Explain the advantages of using the robot to perform surgery.

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..... [4]

(iii) Explain **one** disadvantage of using the robot to perform surgery.

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..... [2]

ON2025/13

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.

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

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