

7 (a) Identify **one** Artificial Intelligence (AI) algorithm to find the shortest distance between two points on a graph.

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 [1]

(b) Describe Deep Learning.

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 [5]

9 (a) Deep Learning is a form of Machine Learning.

(i) State **one** example where Deep Learning is used.

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 [1]

(ii) Identify how Deep Learning can be made more effective.

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 [1]

(b) Describe the back propagation of errors method in Machine Learning.

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 [4]

10 An exception is an error that may cause a program to halt unexpectedly.

(a) Describe how program termination due to an exception can be avoided.

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 [2]

(b) Identify **two** possible causes of exceptions.

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 2

 ② [2]

- 4 A shop installs a new system that allows users to purchase items without going through a manual checkout.

The new system:

- identifies customers when they enter the shop and matches them to their account
- prevents a customer from walking through the automatic barriers if they do not have an account
- automatically detects the items that a customer has taken from a shelf and charges these to the customer's account.

- (a)** The new system uses digital cameras and Artificial Intelligence (AI) to identify the customers.

Explain how the new system uses AI to identify each customer.

[4]

- (b)** The new system uses sensors to identify the items taken from a shelf.

Identify **one** type of sensor that can be used in this new system.

State how the sensor can be used to identify the items taken from a shelf.

Sensor

Use

[2]

- 3** A computer program uses a digital camera to read the words on an item.

The program can read the words that are written on the item, translate the words to a chosen language and then output the words as audio. For example, when used in a supermarket, the program can output the words written on the labels on products.

The program uses Artificial Intelligence (AI).

- (a)** Explain how AI is used in the computer program described.

[4]

- (b) State **two** social benefits of the use of AI in the computer program described.

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[2]

(c) The computer program is released under a commercial software licence.

(i) Describe the features of a commercial software licence.

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(ii) Explain the reasons why an open source software licence might **not** be appropriate for the computer program described.

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6 (a) Describe the structure of a graph as used in an Artificial Intelligence (AI) system.

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(b) Explain how supervised learning and unsupervised learning differ from each other.

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