

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.

[1]

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

..... [1]

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

[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.

[2]

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

1

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

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.

[3]

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

[3]

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

..... [2]

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

[4]