



# Module 2: Solving problems with AI

## Summative assessment – Answers

**Objectives:** Understand the difference between predictive and generative AI

1. Do the descriptions below describe **predictive** or **generative** AI systems? Write **predictive** or **generative** in the boxes below.

	Predictive or generative?	Feedback
Trained on large amounts of data and existing content to create new content like code, text, images or sound	Generative	When a model produces new content, it is considered generative.
Trained on large amounts of data to identify future trends, classify data or create recommendations.	Predictive	A predictive model can make predictions about input data, for instance, how likely it is that the system has identified the face of the phone's owner or where a flood might happen based on its training data.

**Misconception:** Students may incorrectly assume that all AI tools are generative AI tools.



**Objective: Describe the types of problems AI can help solve**

2. Which of the following examples are **predictive AI**, **generative AI**, or **neither**?

	Predictive	Generative	Neither	Feedback
A social media app that uses advertising to recommend products to you	✓			This application does not create new data. The system identifies what you might like based on your data.
A facial recognition system that unlocks your phone	✓			This application does not create new data. It identifies how likely it is that the image of the face that has been input, matches the face of the phone's owner.
A large language model (LLM), like ChatGPT or Gemini		✓		This system generates new text outputs based on a user's prompt.
A flood forecasting system	✓			This application does not create new data. It identifies where a flood might happen based on its training data.
An application that creates artwork in the style of your chosen artist		✓		This application generates a new image based on a user's prompt.
A traffic light system that works on a fixed timer			✓	This system uses a timer. It does not use a data-driven approach to solve the problem and is not an AI-based system.

**Misconception: Students may believe all systems use AI, including those like traffic light systems.**

**Misconception: Students may believe that all AI systems are generative AI systems.**

**Objective: Recognise the ethical issues of developing AI applications**



3. When building an AI-powered content moderator for social media, which of these is an ethical issue that the developer should think about? Select **one** option from the table below.

		Feedback
A. Making sure that large volumes of data can be handled quickly		This is a technical issue. Ethical issues should be treated as more important than technical ones to protect users.
B. Making sure that damaging content is correctly identified	✓	Yes! The developer must ensure that the dataset they have used to create the model is complete, accurate, and not biased.
C. Making sure the social media company will make as much money as possible		This is a business issue. Ethical issues should be treated as more important than business ones to protect users.

**Misconception: A misunderstanding of the word ethics. Not understanding that ethics are moral principles as opposed to a measure of business or technical success.**

**Objective: Describe the stages of the AI project lifecycle**

4. Place the stages of the AI project lifecycle in the correct order. The first two are done for you:

- A. Evaluate the model
- B. Explain the model
- C. Prepare the data
- D. Test the model
- E. Train the model
- F. Define the problem

Answer: F C E D A B

**Feedback: The correct order is: FCEDAB**

**Misconception: Not knowing the correct order of the project lifecycle stages**



**Objective: Describe the stages of the AI project lifecycle**

5. When building a classification model, which of these options is part of the 'prepare the data' stage? Pick **one**.

		Feedback
A. Calculating the accuracy of the model		This takes place during the testing stage.
B. Data cleaning	✓	Yes! The data will be cleaned by removing inaccurate data, removing repeated data, and identifying any missing data. Another task that takes place at this stage is creating the classes and labeling the data.
C. Producing a model card		This takes place during the evaluate stage.

**Misconception: Not understanding what is involved in the data preparation stage of the AI project lifecycle.**

**Objective: Use a model card to evaluate a machine learning model**

6. Which **one** of the following best describes the purpose of a model card?

		Feedback
A. Model cards help application developers and users work out whether or not to use a machine learning model in their product.	✓	Yes! Model cards enable developers to explain what data their model was trained on, what it should be used for, and any limits it has. They allow users or application developers to evaluate it.
B. Model cards describe the technical details of the models that shouldn't be shared with the general public.		No. Model cards enable developers to explain what data their model was trained on, what it should be used for, and any limits it has. They allow users or application developers to evaluate it.

**Misconception: Misunderstanding the purpose of a model card. They may believe model cards are written for developers rather than users.**



**Objective: Describe what a 'user-focused' approach to design is**

7. Which **one** of the following options best describes 'user-focused' design?

		Feedback
A. 'User-focused' design involves creating an AI tool to solve a problem that already exists.	✓	Yes! 'User-focused' design makes sure that the users' needs and their problems are considered at every stage of the AI project lifecycle.
B. 'User-focused' design means building creative AI technologies and then finding users who the system can help.		The user and their problems should be the reason why an AI system is created. Their needs should be considered at every stage of the AI project lifecycle.
C. 'User-focused' design involves building AI applications that look very attractive to the end user, which will encourage people to use them.		'User-focused' design places importance on creating applications that will solve problems faced by the user.  Although being able to easily use a system is important, the 'look' of the system is not central to 'user-focused' design.

**Misconception: Learners may think that a 'user-focused' approach ensures that the design is stylish rather than focusing on whether it would solve a user's problem.**

**Objective: Describe why a machine learning system is appropriate to solve your problem**

8. Are the following options true or false?

**Machine learning is a suitable way to solve a problem when...**

	True / False	Feedback



... the system produces predictions based on new input data.	True	The machine learning model will find patterns in the data that it is trained on. These patterns can then be applied to new data, which it was not trained on, to generate a prediction, for instance whether an image is an apple or a tomato.
... the system predicts labels by identifying patterns in data, which would take too long for humans to write rules to describe.	True	The data patterns identified by a machine learning model are too complicated and too many for a human to be able to describe.
... it must be possible for a human to understand how a system worked out a result. The system must use if-then rules that a human can understand.	False	The data patterns identified by machine learning models are so complicated their output cannot be easily explained. If a human needs to be able to explain how the system produced its result, then machine learning may not be a good choice.

**Misconception:** Students may believe that machine learning could be applied to any problem.

**Objective:** Describe what a confidence threshold is and why they are used

9. Which option accurately describes what a confidence threshold is:

		Feedback
A. Confidence thresholds help machine learning developers decide which predictions to accept: predictions with a confidence score below the threshold are ignored.	✓	<p>Yes! A human developer decides on a system's confidence threshold. This is the lowest level of confidence that needs to be met for a prediction to be considered acceptable.</p> <p>If a machine learning system generates the correct label but with a 10% confidence score, this may not meet the confidence threshold. If so, it would be ignored.</p>
B. A confidence threshold is a value made by the machine learning model based on the average accuracy of the model.		A human developer decides on a system's confidence threshold. This is the lowest level of confidence that needs to be met for a prediction to be considered acceptable.

		<p>Imagine that the model developer decides that the confidence level is 75%. If they test the model and it predicts the correct label but only with 60% confidence, this would not be considered an accurate result and would be ignored.</p>
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**Misconception:** Students may believe that a confidence threshold is set by the artificial intelligence system and not a human.

**Objective:** Demonstrate how the accuracy of an ML model is measured

10. If a machine learning model outputs a **confidence score** of 100%, does it mean the prediction is definitely correct?

		<b>Feedback</b>
A. Yes		<p>Incorrect. Even if the system outputs a 100% confidence score for a label, the system might still have got the label wrong. The machine learning model identified patterns in training data. If the training data was inaccurate, had gaps, or was biased, then the label the system produces could still be wrong.</p>
B. No	✓	<p>Correct! Even if the system has output a 100% confidence score for a label, the system still might have got the label wrong. The machine learning model identified patterns in training data. If the training data was inaccurate, had gaps, or was biased, then the label the system produces could still be wrong.</p>

**Misconception:** Students might believe that if the AI system gives an object a label with 100% confidence, it will definitely be correct. This is not true because the accuracy of the model will be determined by the amount and quality of the data that it has been trained on.



**Objective: Demonstrate how the accuracy of an ML model is measured**

11. Is a **confidence score** a measure of **accuracy** in a machine learning model?

		Feedback
A. Yes		<p>No. Confidence is not the same as accuracy. A confidence score shows how likely it is that a predicted label is correct.</p> <p>Accuracy is a measure of how many predictions have the correct label and meet the confidence threshold and are therefore considered acceptable.</p>
B. No	✓	<p>Yes! Confidence is not the same as accuracy. A confidence score shows how likely it is that a predicted label is correct.</p> <p>Accuracy is a measure of how many predictions have the correct label and meet the confidence threshold and are therefore considered acceptable.</p>

**Misconception: A confidence score is not a measure of accuracy. It is a measure of how probable it is that the model's prediction is correct. If the model is trained on a dataset that does not represent what the model is trying to predict, then the model could give a high confidence score for an incorrect label.**

**Objective: Demonstrate how the accuracy of an ML model is measured**

12. A machine learning model is being developed to classify images of items for recycling. The results of the testing are below:

Correctly labelled data? (Yes/No)	Confidence score



Yes	81%
Yes	67%
No	16%
Yes	93%
No	30%
Yes	91%
Yes	77%
Yes	90%
No	89%
Yes	70%

$$\text{Accuracy} = \frac{\text{?}}{\text{Total number of predictions}} \times 100$$



**Part A:** The formula for calculating the accuracy of a model is shown above. Which of the following should replace the question mark?

		Feedback
A. Number of correctly predicted labels		A label might be correctly predicted but have a confidence score that does not meet the confidence threshold.  This means that the AI system is more likely to label other items incorrectly and this would not give a good measure of accuracy.
B. Number of predictions that are correct AND above the threshold	✓	Yes!
C. Number of incorrectly predicted labels		This would give you a measurement of how inaccurate the model was.

**Misconception:** The student may not realise that a prediction is only acceptable if the label is correct AND the confidence score is above the confidence threshold to be used in this calculation.

**Part B:** The confidence threshold is 75%. What is the accuracy of the model? Give your answer as a percentage.

<b>Space for working out:</b>	5 out of 10 of the predictions are correct and above the threshold. We divide 5 by 10 and multiply by 100 which gives us 50%
<b>Answer:</b>	50%

**Misconception:** Students may not understand how to calculate the formula.

**Objective: Identify information that would help evaluate a machine learning model**

13. You have been asked to consider the accuracy of a model that predicts the spread of wildfires in the area you live in. What would you need to think about?

		Feedback
A. The confidence threshold that has been set by the developer	✓	Yes, as the developer would want to know how the accuracy has been calculated. If the model is 100% accurate but the confidence threshold was very low, this may or may not be a problem, depending on how the model will be used.
B. The technical skills needed to implement the model		No, this is not needed to help evaluate how useful this model will be for a particular application.
D. The amount of time spent training the model		The amount of time training a model would not give application developers any information about how useful that model would be for them.

**Misconception: Students may think that how long the model was tested for is a valid way to evaluate a model.**

14. Which **two** of the following pieces of information should you include on a model card?

A. The accuracy score of the model	✓
B. Any known bias in the model	✓
C. The amount of time spent training the model	
D. The technical skills needed to use the model in an application	

**Misconception: Students may not remember what aspects of the model are recorded on the model card.**