Grade 10 Computer, Explained

Unit 5 · AI and Contemporary Technologies

ANSWER KEY · FOR TEACHERS

Full marks 29

Give the marks for the points in the marking scheme; an answer in other words that says the same is right.

1 Key words

1. artificial intelligence
2. machine learning
3. supervised
4. generative AI
5. Internet of Things
6. augmented reality
7. cloud computing
8. e-governance

Each carries 0.5 mark. **K · 4**

2 Label the diagram

1. The device a small computer, a radio, a battery
2. The network mobile data or Wi-Fi
3. The cloud stores the readings, charts, sends alerts

Each carries 1 mark. **K · 3**

3 Multiple choice

i. **a.** supervised **K · 1**

Supervised learning learns from labeled data: each example comes with its right answer.

ii. **b.** a sensor that measures a river's level and sends it over the mobile network **U · 1**

IoT means physical things with sensors that share their data over the internet by themselves. A calculator and an offline computer share nothing.

iii. **b.** fraud detection **U · 1**

Fraud detection: the model learned what is normal for each customer and flags what isn't.

iv. **b.** augmented reality **A · 1**

The real view is still there, with information added on top: augmented reality. Virtual reality would replace the view completely.

v. **c.** IaaS **A · 1**

Renting a bare virtual server and installing everything yourself is IaaS. With PaaS it would only upload its program; with SaaS it would use a ready-made results app.

4 True or false

i. ✓ **True** **U · 3**
ii. ✗ **False:** Google Drive is SaaS, a finished app; IaaS is a bare virtual server or plain storage that you set up yourself.
iii. ✗ **False:** That is AR; a VR headset covers the eyes and replaces the real world with a virtual one.
iv. ✓ **True**
v. ✗ **False:** Motors and wheels act; sensors such as cameras and distance sensors sense.
vi. ✓ **True**

Each carries 0.5 mark.

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5 Match the columns

1. G2C → **c.** a citizen applying for a passport online — K · 2
2. G2B → **d.** a company filing its tax online
3. G2G → **a.** a ministry sharing data with the municipalities
4. G2E → **e.** a government teacher checking her salary and leave online

Each carries 0.5 mark.

6 Short answers

a. MARKING SCHEME — A · 2

- ✓ i. Supervised: every training email came with its label, the right answer.
- ✓ ii. Unsupervised: the songs have no labels; the computer finds the groups itself.

b. MARKING SCHEME — A · 2

- ✓ Privacy: photos of children's faces are collected and stored; collect only what is needed, keep it secure, and ask parents' consent (or say who can see it and for how long).
- ✓ Bias or mistakes (it may recognize some faces less well and mark them absent), or security (the face data could be stolen); a teacher checks the list, the system is tested on all students, or the data is encrypted.

c. MARKING SCHEME — U · 2

- ✓ One limitation, e.g. the goods can't be seen or touched before buying, so they may not be as shown.
- ✓ A second, e.g. online fraud and fake sites, delivery delays or costs in remote places, or the need for internet and digital payment (or another correct limitation).

7 Long answer

ANSWER — U · 4

In a **smart city**, thousands of IoT devices (sensors, cameras, meters) collect data about traffic, energy, water, air and waste and share it over the internet, so the city can be managed by facts, often automatically.

- **Traffic:** sensors and cameras count vehicles, and traffic lights change their timing with the traffic; apps show buses' positions and free parking spaces, so there are fewer jams.
- **Energy:** streetlights dim when nobody is near and brighten when someone comes; smart meters show homes how much electricity they use.
- **Waste:** bins report when they are full, so trucks collect only full ones, saving fuel.
- **Water:** sensors find leaks in pipes, and smart meters measure use.
- **Safety and environment:** air-quality sensors warn people on badly polluted days; smoke detectors call the fire brigade; river sensors warn of floods.

Problems to solve: the cost, keeping the devices secure from hackers, and the privacy of people being watched.

MARKING SCHEME

- ✓ What IoT does in a smart city: sensors, cameras and meters collect data and share it over the internet, so the city is managed by facts, often automatically.
- ✓ One example explained, e.g. traffic lights that change their timing with the traffic, or bus positions shown in an app.
- ✓ A second example, e.g. streetlights that dim when nobody is near, bins that report when they are full, or sensors that find leaks in water pipes.
- ✓ A third example, e.g. air-quality or flood warnings, or smoke detectors that call the fire brigade (or a problem to solve: cost, security, privacy).

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8 Think

ANSWER HA · 2

A model learns only from its training examples. It never saw cloudy light, other varieties or other places, so the farmer's photos look unlike anything it learned from, and it guesses badly. Its makers should train it again on many more varied photos (different light, weather, places, varieties and phones), and test it on photos like the farmers' before giving it out.

MARKING SCHEME

- ✓ The training photos weren't varied: the model learned from one kind of photo, and new photos unlike them confuse it.
- ✓ Retrain with more varied, labeled photos (light, weather, places, varieties), and test it on new ones like the farmers'.

9 Activity: Train a model

(not marked)

WHAT STUDENTS SHOULD FIND

With 5 photos of each it gets most clear photos right, and some wrong, more often for photos unlike any it learned from. Shown a bus, it still answers "Cat" or "Dog", the only answers it knows. More, and more varied, examples make it better. It is supervised learning: every training photo had a label.

Marks by level	Knowledge	Understanding	Application	Higher ability	**Total**
Marks	10	11	6	2	**29**

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