

Solutions

Each answer shows the steps, then the **result**.

2.1 any **two** of:

- you agree to a published **code of conduct**, so clients know the standard you work to
- the body can investigate complaints and expel members, so you are **accountable** to someone outside your employer
- it sets and recognises **continuing professional development**, keeping your competence current
- membership is a **recognised qualification**, which is evidence of competence to a client or employer

2.2

- a **Free Software Foundation** licence, such as the **GPL**
- it may run, read and modify the source code freely, which is what “use and modify” needs
- the GPL’s **copyleft** condition requires anything redistributed to carry the same licence, so the charity’s improvements stay available to everyone – which is exactly what it wants
- (an OSI licence would also allow the modification, but would let someone close the improvements again, so it does not meet the second requirement)

2.3

- shareware is a **closed-source, copyrighted** program given out free of charge so that a user can **try** it before buying
- the trial is limited – by time, or by features disabled, or by a watermark or reminder screen – and payment is needed to keep using it
- unlike open-source software, the **source code is not supplied** and the user may not modify it

2.4 any **two** of:

- medical image diagnosis; speech recognition and translation; self-driving vehicles; fraud detection; recommendation or search systems; game playing; handwriting recognition

2.5

- training and running large AI models consumes a **great deal of electricity** in data centres
- much of which is still generated by burning fossil fuels, so carbon emissions rise – and the cooling of those data centres also consumes water
- (a gain is also creditable: better routing, grid and building control can cut fuel use elsewhere)

3.1 B

- the right to read, modify and pass on identifies it as a free/open licence, which rules out **A** and **C**
- the requirement that the same licence travels with any redistributed version is **copyleft**, which a permissive licence such as MIT (**D**) does not impose

3.2

(a)

- **commercial** (proprietary) software
- nobody at the school needs to read or change the source code, so the freedoms of an open licence buy it nothing
- the fee pays for **guaranteed technical support and regular updates**, which the school has said it needs and which no one is obliged to provide for a free licence

(b)

- **shareware**
- one limitation: the trial expires after a set period / some features are disabled / exported video carries a watermark / a reminder screen appears

(c)

- **open source**, under either an OSI or an FSF licence
- it can be copied and installed at home at no cost, and the **source code is available**, so the technician may modify it to remove the unwanted features

3.3

(a)

- software that performs tasks that would normally require human intelligence
- by **learning patterns from data** (here, from many previous scans) rather than by following rules written out by a programmer

(b)

- **benefit**: the system can compare each scan against far more previous cases than one radiologist could hold in mind
- so tumours are more likely to be caught early, and patients in hospitals with too few specialists can still be screened quickly
- **risk**: the model learns from its training data, so if that data under-represents some group of patients the system will be less accurate for them
- and if a radiologist comes to rely on the flags, a missed tumour may go unchallenged – with no clear answer to who is **accountable**, the hospital, the radiologist or the supplier

(c)

- radiologists’ time is used only on the scans that need judgement, so the hospital screens more patients for the same staffing cost

- against which the hospital must pay for the system, its licensing and its maintenance, and fewer junior posts may be needed – so jobs are displaced even where the total cost falls
- (either direction earns the marks, provided the point is genuinely **economic**)

(d)

- training a large model runs many processors continuously for a long time, consuming a very large amount of **electricity**
- which produces carbon emissions wherever that electricity is generated from fossil fuels, and the data centre additionally consumes water for cooling