AP COMPUTER SCIENCE PRINCIPLES • EXERCISE SHEET

5.3 Computing Bias

Name: _____ Class: _____ Date: _____ **Total: 8 marks**

Objective

Build the skills to answer exam questions on **computing bias**.

You must be able to:

- explain how **computing bias** 计算偏见 can be built into a program, sometimes unknowingly
- describe how biased **training data** 训练数据 leads to unfair results
- identify how bias can **harm** particular groups
- propose ways developers can **reduce** bias

1 Worked examples

Study these first. Each one shows the method for a question type used later.

■ Computing bias

Bias can be **built into** a program, sometimes **without the developers realising** it.

■ Biased training data

If the **training data** used to build a program is biased, the program can produce **unfair** results that **harm** particular groups.

■ Reducing bias

Testing with **diverse** users and data helps reveal hidden bias, and developers can act on it during design and development to **reduce** it.

2 Practice

2.1 Define computing bias. [1]

2.2 State how biased training data causes unfair results. [1]

2.3 State one way developers can reduce bias. [1]

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3 Exam-style questions

3.1 Computing bias can be built into a program [1]

- **A** always on purpose
- **B** sometimes without the developers' awareness
- **C** only by users
- **D** never

3.2 Testing with diverse users helps to [1]

- **A** add bias
- **B** reveal hidden bias
- **C** slow the program
- **D** compress data

3.3 A facial-recognition app works poorly for some groups of people.

(a) State a likely cause. [1]

(b) State one harm this could do. [1]

(c) State one way to reduce the bias. [1]

4 Go further

- work through the **5.3 Computing Bias** lesson on the **Learn** page;
- read the **Impact of Computing** section of the AP Computer Science Principles handout on the **Know** page.

Solutions

2.1 unfairness built into a program, sometimes without the developers realising it.

2.2 the program learns the bias in the data and repeats it in its results.

2.3 test with diverse users and data (or review the training data).

3.1 B.

3.2 B.

3.3 (a) biased or unrepresentative training data. (b) unfair treatment of the affected groups. (c) test and train with more diverse data.