

6 Security, privacy and data integrity

– Part 1

Name: _____ Class: _____ Date: _____

Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

English	中文	Write it 3 times (English)		
secure	安全	_____	_____	_____
malware	恶意软件	_____	_____	_____
phishing	网络钓鱼	_____	_____	_____
encryption	加密	_____	_____	_____
firewall	防火墙	_____	_____	_____
authentication	身份验证	_____	_____	_____
validation	验证	_____	_____	_____
verification	核对	_____	_____	_____
check digit	校验位	_____	_____	_____
parity check	奇偶校验	_____	_____	_____

Recall

At IGCSE you met online dangers and passwords. Bring this with you:

- Data needs to be kept **secure** 安全 from people who should not see or change it.
- You used passwords and antivirus software.

At AS we name the main threats, the ways to protect data, and how to check data is correct.

New ideas

Read these first. Each idea has a short worked example. Then do the Practice.

■ 1 Threats

- **malware** 恶意软件 is harmful software — viruses, worms and Trojans.
- **phishing** 网络钓鱼 tricks people into giving away passwords using fake messages or websites.

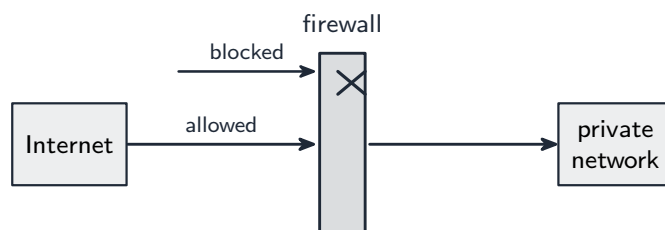
malware
harmful software —
viruses, worms, Trojans

phishing
fake messages that trick
you into giving passwords

Worked example. A phishing email pretends to be your bank and links to a fake login page; if you type your password there, the attacker captures it.

■ 2 Protecting data

- **encryption** 加密 scrambles data so that only someone with the correct key can read it.
- a **firewall** 防火墙 controls which traffic may enter or leave a network.
- **authentication** 身份验证 checks who you are — a password, a fingerprint, or two-factor codes.



Worked example. Encryption turns a message like HELLO into scrambled text such as XZ4PQ; intercepted without the key, it means nothing.

■ 3 Keeping data correct (integrity)

- **validation** 验证 checks that entered data is sensible (for example a range check or a type check).
- **verification** 核对 checks that data was copied or typed correctly (for example double entry).
- a **check digit** 校验位 is an extra digit added to a number to catch typing errors; a **parity check** 奇偶校验 adds an extra bit so a single flipped bit is noticed.

7 data bits							parity
0	1	1	0	1	0	0	1

data has three 1s; for **even parity** the parity bit is **1** (four 1s in total)

Worked example. For even parity, count the 1s in 0110100 — that is three (odd) — so the parity bit is 1, which makes the total even.

Watch out: validation only checks data is *sensible*, not *true* — a valid-looking but wrong phone number can still pass a length check.

Practice

6.1 Give one method of authentication. [1]

6.2 Explain what encryption does. [1]

6.3 State what malware is, and give one example. [2]

6.4 State one difference between validation and verification. [2]

6.5 A system uses **even** parity. The seven data bits are 1010101. State the parity bit

needed.

[2]

6.6 Explain *why* a parity check can fail to notice an error if *two* bits are flipped. [2]

6.7 Challenge. A website wants to protect its users' passwords. Suggest two different measures and state what each one protects against. [2]