Grade 7 Computing

Unit 6 · Networks and the Internet

ANSWER KEY · FOR TEACHERS

Full marks 34

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. packets
2. header
3. reassembling
4. IP address
5. router
6. routing table
7. hop
8. resilience

Each carries 0.5 mark. **K · 4**

2 Label the diagram

1. radio
2. Wi-Fi router
3. internet service provider
4. fiber box

Each carries 0.5 mark. **K · 2**

3 Multiple choice

i. **b.** the address it is going to **K · 1**

A router looks only at the header's address, and sends the packet along the link that leads nearer to it. (Most messages are scrambled anyway, so routers couldn't read them if they tried.)

ii. **b.** 192.168.1.4 **U · 1**

Each of the four numbers is one byte, so it must be between 0 and 255; 300 is too big. moecdc.gov.np is a name, which must be looked up to find its address, and the last is a phone number.

iii. **b.** a hop **K · 1**

Each step is a hop. The tracert command lists the routers, one line for each hop.

iv. **c.** If the links through India were cut, the internet could still reach Nepal by another way. **U · 1**

Resilience comes from having more than one way. With only one way out, one cut silences a whole country, as it did Tonga in 2022.

v. **b.** Videos playing by themselves in her apps, or updates and backups running over mobile data **A · 1**

Text messages use almost nothing. When data runs out fast, video is nearly always the reason (autoplay, short videos in a feed), or large updates and backups in the background. The phone's list of apps by data use would show which.

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4 True or false

U · 3

i. ✓ **True**
ii. ✗ **False:** Each packet can go its own way, so they may arrive in any order.
iii. ✓ **True**
iv. ✗ **False:** Outside the home, the whole home has one address, the router's.
v. ✓ **True**
vi. ✗ **False:** The Wi-Fi password lets people join the Wi-Fi; the admin password opens the router's settings.

Each carries 0.5 mark.

5 Short answers

a. U · 3

MARKING SCHEME

✓ The address it is going to, the address it came from, and its number in the message.
✓ It reads each packet's number and puts the pieces in order, 1, 2, 3, 4, whatever order they came in.
✓ It tells the sender which numbers have arrived, and the sender sends the missing packet again.

b. U · 2

MARKING SCHEME

✓ One address on the internet, the router's (each device has its own home address inside).
✓ The router sends each request out with the home's address and remembers which device asked; it passes the answer back to that device.

c. K · 2

MARKING SCHEME

✓ i. A router passes each packet one step nearer the address in its header (joining networks); ii. a server keeps websites or files and sends them to anyone who asks.
✓ iii. A fiber box turns electrical signals into flashes of light in the fiber, and back; iv. a mobile tower carries data by radio between phones and the phone company's network.

6 Calculations

a. A · 2

ANSWER

3 MB = 3 × 1,024 × 1,024 = **3,145,728 bytes**.
3,145,728 ÷ 1,460 ≈ 2,154.6, so about **2,155 packets** (the last one only part full).

MARKING SCHEME

✓ 3 × 1,024 × 1,024 = 3,145,728 bytes.
✓ 3,145,728 ÷ 1,460 ≈ 2,155 packets (about 2,150).

b. A · 2

ANSWER

time = distance ÷ speed.

i. There and back is 60 km: 60 ÷ 200,000 = **0.0003 s**, about a third of a thousandth of a second.
ii. 9,000 ÷ 200,000 = **0.045 s**, about one twentieth of a second.

MARKING SCHEME

✓ i. 60 km ÷ 200,000 km/s = 0.0003 s.
✓ ii. 9,000 km ÷ 200,000 km/s = 0.045 s.

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c. ANSWER A · 3

3 GB = 3 × 1,024 = 3,072 MB. For each day: 3,072 ÷ 30 ≈ **102 MB.**
Video call: 15 × 6 = 90 MB a day. Left: 102 − 90 = about **12 MB a day.**
Medium-quality video: 12 ÷ 12 = about **1 minute** a day. The calls almost fill the pack.

MARKING SCHEME

✓ 3,072 MB ÷ 30 ≈ 102 MB a day.
✓ 15 × 6 = 90 MB for the call, so about 12 MB a day is left.
✓ 12 ÷ 12 = about 1 minute of medium-quality video a day.

7 Long answer

ANSWER A · 4

i. **Doesn't work.** The Wi-Fi still shows full bars, because the router is fine, but the router's only link to the internet is cut.
ii. **Works**, if a tower is in reach: mobile data goes by radio to the tower, a different way that doesn't use the cut cable.
iii. **Works.** Each home has its own cable, and the internet company's network has other ways; only Bimal's home's edge link is cut.
iv. **Works.** It goes through other cables and routers, nowhere near Bimal's home. The mesh in the middle is untouched.

MARKING SCHEME

✓ i. Doesn't work: the router is fine (full Wi-Fi bars), but its only link to the internet is cut.
✓ ii. Works, if a tower is in reach: mobile data goes by radio to the tower, not through the cut cable.
✓ iii. Works: each home has its own cable, and only Bimal's home's link at the edge is cut.
✓ iv. Works: it goes through other cables and routers, and the mesh in the middle is untouched.

8 Think

ANSWER HA · 2

The home Wi-Fi router needs electricity. With the power off (and no inverter or battery at home) it stops, so the Wi-Fi is gone, even though the internet itself is fine. Most mobile towers have large batteries, and many have generators or solar panels, so they kept running through most power cuts, and the phone, on its own battery, could still reach them: a different way, by a different kind of link, with its own power.

MARKING SCHEME

✓ The home router needs electricity, so with the power off the Wi-Fi stops, though the internet is fine.
✓ Mobile towers have batteries (or generators, solar panels), so they keep running, and the phone runs on its own battery.

9 Activity: Which apps use your data?

(not marked)

WHAT STUDENTS SHOULD FIND

Video apps, short-video apps and social media apps with videos are almost always at the top, often using many times more than everything else together. Sometimes an app that is rarely opened is high on the list, because of updates or backups in the background. Setting updates and backups to Wi-Fi only, and switching off autoplay, saves the most.

Marks by level	Knowledge	Understanding	Application	Higher ability	**Total**
Marks	10	10	12	2	**34**

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