Quick Reference (What students saw)

Relation: any set of ordered pairs (x, y).
Function: each input x has exactly one output y.
Domain: all inputs. **Range:** all outputs.
Notation: $f(x)$ is the output when input is x. Substitute with parentheses.

1. (10 points) **Is it a function? Domain & Range.**
$R = \{(0, 2), (1, 5), (2, 5), (1, 5)\}$.

Solution: **(a)** Yes, R is a function. Every input used $(0, 1, 2)$ maps to exactly one output. The pair $(1, 5)$ appears twice, but that's not a problem—there aren't two *different* outputs for the same input.

(b) Domain $= \{0, 1, 2\}$. Range $= \{2, 5\}$.

2. (12 points) **Fix the relation (table view).**

x	y
-1	3
0	0
1	4
1	

Solution: **(a)** To be a function, the repeated input $x = 1$ must produce the *same* output both times. So the blank must be 4.

(b) New relation: $\{(-1, 3), (0, 0), (1, 4)\}$ (we can omit duplicates).

3. (14 points) **Function evaluation (numbers and constants).**
$f(x) = 3x - 4$.

Solution: **(a)** $f(0) = 3(0) - 4 = -4$. **(b)** $f(5) = 15 - 4 = 11$. **(c)** $f(-2) = 3(-2) - 4 = -6 - 4 = -10$.
(d) $f(a) = 3a - 4$ (treat a like a number).
(e) $f(2a + 1) = 3(2a + 1) - 4 = 6a + 3 - 4 = 6a - 1$.

4. (12 points) **Solve for the missing number.**
$g(x) = k - 2x$.

Solution: **(a)** $g(4) = k - 2(4) = k - 8 = 9 \Rightarrow k = 17$.
(b) $g(x) = 1 \Rightarrow k - 2x = 1 \Rightarrow -2x = 1 - k \Rightarrow x = \dfrac{k-1}{2}$.
(If using $k = 17$ from part (a), then $x = \frac{16}{2} = 8$.)

5. (12 points) **Plain-English interpretation.**
$p(x) = 2x + 6$.

Solution: (A) **True.** $p(4) = 2 \cdot 4 + 6 = 14$ means input 4 gives output 14.
(B) **True.** $p(a) = 2a + 6$ even if a is unknown—function rules work for any input.
(C) **True.** Solve $2x + 6 = 10 \Rightarrow 2x = 4 \Rightarrow x = 2$.