FOR GROWN-UPS

Answer Key

The whole packet rests on ONE idea: the equal sign means the two sides weigh the SAME -- it is NOT an arrow pointing to 'the answer next'. When she reads '=' aloud, make her say 'is the same as', never 'makes' or 'gives'. If she writes a chain like 8 + 4 = 12 + 5 (the classic 'keep going' mistake), put your hands out like a scale: 'this side weighs 12, that side weighs 17 -- does it balance?' The balance is the proof. At the table, set out two little piles and ask 'do these balance? how do you know?' before she counts.

2 · What the Equals Sign Really Means

- Ex 1: BALANCED (level). 4 + 1 is the same weight as 5, so 4 + 1 = 5 is TRUE.
- Ex 2a: 6 = 6 -> BALANCED / TRUE (both pans hold 6).
- Ex 2b: 3 + 4 vs 7 -> BALANCED / TRUE (3 + 4 is the same as 7).
- Ex 3: TIPS / not balanced. 5 + 3 weighs 8 but the other pan holds only 6, so the 5 + 3 side sinks. 5 + 3 = 6 is FALSE.

3 · Make the Scale Balance

- Ex 1: NO, it does not balance. 4 + 3 = 7 but the other pan is 8, so the 8 side is heavier and sinks. To FIX it, add 1 more counter to the 4 + 3 pan (make it 8), OR take 1 off the 8 pan (make it 7). Either fix makes both sides the same.
- Ex 2a: add 2 counters to reach the 9 pan (7 + 2 = 9). [tips toward 9]
- Ex 2b: add 1 counter to the 5 + 2 pan to match 8 (5 + 2 = 7, needs 1 more). [tips toward 8]
- Ex 3: Sam put 6 + 4 (= 10) against 8, so the 6 + 4 side is heavier and sinks. It is NOT balanced. She should cross out enough / add to the light side so both sides make 10 (or note 6 + 4 does not equal 8).

4 · The Missing Counters

- Ex 1: draw 4 counters in the empty pan. 3 + 4 = 7 balances the 7 pan. So the missing number is 4: 3 + ? = 7 -> ? = 4.
- Ex 2a: 8 = 5 + ? -> draw 3 (5 + 3 = 8). ? = 3.
- Ex 2b: 6 + ? = 9 -> draw 3 (6 + 3 = 9). ? = 3.
- Ex 3: 10 = ? + 4 -> the empty pan needs 6 (6 + 4 = 10). ? = 6. The unknown is on the LEFT this time -- the total (10) is on the left pan.

5 · Find the Unknown Anywhere

- Ex 1a: ? + 3 = 7 -> ? = 4 (4 + 3 = 7). Unknown is the FIRST number.
- Ex 1b: 5 + ? = 8 -> ? = 3 (5 + 3 = 8). Unknown is the SECOND number.
- Ex 1c: 9 = 4 + ? -> ? = 5 (4 + 5 = 9). Total on the LEFT, unknown on the right.

6 · True, False, and Sam's Trick

- Ex 1a: 8 = 8 -> TRUE (same on both sides).
- Ex 1b: 5 + 2 = 6 -> FALSE (5 + 2 = 7, not 6).
- Ex 1c: 4 + 3 = 3 + 4 -> TRUE (both weigh 7; order doesn't change the weight).
- Ex 1d: 9 = 5 + 4 -> TRUE (total on the left is fine; 5 + 4 = 9).
- Ex 1e: 7 = 10 -> FALSE (7 and 10 are different weights).
- Ex 2: fill to make each TRUE: a) ?+6=10 -> 4; b) 3+? = 2+6 -> both sides must weigh 8, so 3+5, ?=5; c) 12 = ?+7 -> 5.
- Ex 3 (the TRAP): Sam is WRONG. He wrote 8 + 4 = 12 + 5 because he 'kept going' -- he put the running answer 12 after the =, then tacked on + 5. But the left side weighs 12 and the right side weighs 17 -- the scale would TIP, so it is FALSE. The = is not an arrow to the next answer; both sides must weigh the same.
- Ex 4 (COUNTER-trap): Sam is RIGHT this time. 10 = 6 + 4 is TRUE -- the total is allowed on the LEFT, and 6 + 4 really is 10. Don't cross it out just because it looks 'backwards' -- backwards is fine when both sides weigh the same.

7 · Case Closed at the Town Scale

- Ex 1: 4 + 3 = 7 -> the Martian's pan (4 + 3) is the same as 7 apples, so it BALANCES. TRUE.
- Ex 2: 6 = ? + 2 -> the skater needs 4 more stickers (4 + 2 = 6). ? = 4.
- Ex 3 (the trap, in a story): Sam's receipt says 5 + 5 = 10 + 3. He kept going and wrote 13 worth on a 10-cookie order. WRONG -- left side is 10, right side is 13, it tips. The fair trade is 5 + 5 = 10. Circle NO / not fair.
- Ex 4 (counter-trap): Sam's other receipt says 9 = 4 + 5. This one IS fair -- 4 + 5 = 9, the total just sits on the left. Circle FAIR. Don't reject it for looking backwards.