Writing and Evaluating Expressions

Explore ideas and representations

Name _____ **Date** _____ **Score** _____ / 10

QUICK REVIEW

An expression names a calculation but has no equals sign to solve. Substitute values and follow parentheses, multiplication, then addition. "Three times a number, then add 4" is $3x + 4$. At $x = -2$, $3(-2) + 4 = -6 + 4 = -2$.

Worked example

Example: write an expression for 3 times a number plus (4). Evaluate it at $x = -2$.

1. Substitute $x = -2$: $3(-2) + (4)$.
2. Multiply first: $3(-2) = -6$.
3. Add the constant: $-6 + (4) = -2$.
Answer: $3x + 4$; value -2.

Practice Problems

Show your thinking.

1. Number machine: write an expression for 4 times a number plus (2). Evaluate it at $x = -2$.

2. Packing rule: write an expression for 2 times a number plus (-6). Evaluate it at $x = 4$.

3. The expression is $3x + 7$. Complete outputs for $x = 0, 2, 4$.

x	output
0	?
2	?
4	?

4. Compare $2(x + 3)$ and $2x + 3$ at $x = 2$.

5. Translate: subtract 4 from twice x. Evaluate for $x = -3$.

6. A rule is $y = -2x + 7$. Recover the input giving output 13.

7. Locker-code rule: write an expression for 5 times a number plus (-8). Evaluate it at $x = -2$.

8. Token-count rule: the rule is $-3x + 14$ units for x batches. Find the output for 3 batches and the change if one batch is added.

9. Tile-pack rule: a student evaluates $4x - 7$ at $x = 5$ as $4(5 + (-7))$. Correct the grouping and find the value.

10. Meter-offset rule: write an expression for 7 times a number plus (2). Evaluate it at $x = -1$.

Answer Key

1. $4x + 2$; value -6.
2. $2x - 6$; value 2.
3. Rule $3x + 7$; outputs $7, 13, 19$.
4. A: 10; B: 7; B is 3 less.
5. $2x - 4$; value -10.
6. $x = -3$.
7. $5x - 8$; value -18.
8. $-3x + 14$; value 5. One more batch adds -3 units.
9. $4x - 7$; value 13.
10. $7x + 2$; value -5.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. Substitute $x = -2$: $4(-2) + (2)$.
2. Multiply first: $4(-2) = -8$.
3. Add the constant: $-8 + (2) = -6$.

Problem 2

1. Substitute $x = 4$: $2(4) + (-6)$.
2. Multiply first: $2(4) = 8$.
3. Add the constant: $8 + (-6) = 2$.

Problem 3

1. At $x = 0$, $3(0) + 7 = 7$.
2. At $x = 2$, $3(2) + 7 = 13$.
3. At $x = 4$, $3(4) + 7 = 19$; reverse: $(19 - 7)/3 = 4$.

Problem 4

1. $2(2 + 3) = 2(5) = 10$.
2. $2(2) + 3 = 7$.
3. Difference $10 - 7 = 3$; the expressions are not equivalent.

Problem 5

1. Twice x is $2x$; removing 4 gives $2x - 4$.
2. At $x = -3$, $2(-3) = -6$.
3. Then $-6 - 4 = -10$. Doubling the entire difference would instead give -14.

Problem 6

1. Subtract the constant: $-2x = 13 - 7 = 6$.
2. Divide by -2: $x = 6/(-2) = -3$.
3. Check: $-2(-3) + 7 = 13$.

Problem 7

1. Substitute $x = -2$: $5(-2) + (-8)$.
2. Multiply first: $5(-2) = -10$.
3. Add the constant: $-10 + (-8) = -18$.

Problem 8

1. Substitute $x = 3$: $-3(3) + (14)$.
2. Multiply first: $-3(3) = -9$.
3. Add the constant: $-9 + (14) = 5$. At $x = 4$ the output is 2, a change of -3.

Problem 9

1. Substitute $x = 5$: $4(5) + (-7)$.
2. Multiply first: $4(5) = 20$.
3. Add the constant: $20 + (-7) = 13$.

Problem 10

1. Substitute $x = -1$: $7(-1) + (2)$.
2. Multiply first: $7(-1) = -7$.
3. Add the constant: $-7 + (2) = -5$.

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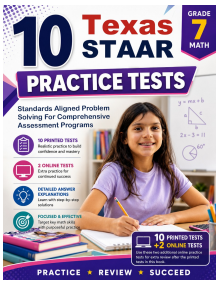

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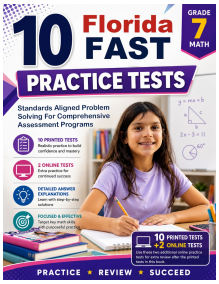

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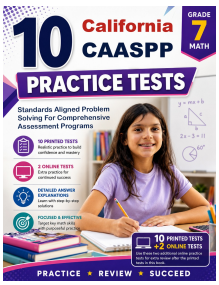

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