Variables in Real-World Problems

Variables in real-world problems: Models and calculations

Name _____ **Date** _____ **Score** _____ / 6

QUICK REVIEW

Define what each variable measures. A rule such as $T = 4n + 7$ starts at 7 when $n = 0$ and adds 4 for each increase of 1 in n. A one-time fee is added once, not multiplied by the count. A count uses whole numbers, while a length can be fractional.

Worked example

Each notebook costs 3 dollars plus a 2-dollar delivery fee. Write a cost model. Let n count notebooks; evaluate for $n = 4$.

1. For n notebooks, the 3 dollars per unit contributes $3n$ dollars.
2. The 2 dollars occurs once, giving $C = 3n + 2$.
3. Substitute $n = 4$: $C = 3(4) + 2 = 12 + 2 = 14$ dollars.
Answer: $C = 3n + 2$ dollars; 14 dollars.

Practice Problems

Show your thinking.

1. A game costs 5 dollars to enter and 4 per round. Write total cost. Let n count rounds; evaluate for $n = 3$.

2. A shop charges 7 dollars setup and 2 per card. Write the bill. Let n count cards; evaluate for $n = 6$.

3. A ticket costs 6 dollars with no fixed fee. Write total cost. Let n count tickets; evaluate for $n = 5$.

4. A fundraiser starts with 10 dollars and adds 3 per sale. Write the total raised. Let n count sales; evaluate for $n = 8$.

5. A student says the fixed fee in a 5-per-item, 4-fixed model is 5. Correct the model. Let n count items; evaluate for $n = 2$.

6. Recover a cost model from a 7-dollar item price and 3-dollar fixed fee. Let n count items; evaluate for $n = 4$.

Answer Key

1. $C = 4n + 5$ dollars; 17 dollars.
2. $C = 2n + 7$ dollars; 19 dollars.
3. $C = 6n$ dollars; 30 dollars.
4. $T = 3n + 10$ dollars; 34 dollars.
5. $C = 5n + 4$ dollars; 14 dollars.
6. $C = 7n + 3$ dollars; 31 dollars.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. For n rounds, the 4 dollars per unit contributes $4n$ dollars.
2. The 5 dollars occurs once, giving $C = 4n + 5$.
3. Substitute $n = 3$: $C = 4(3) + 5 = 12 + 5 = 17$ dollars.

Problem 2

1. For n cards, the 2 dollars per unit contributes $2n$ dollars.
2. The 7 dollars occurs once, giving $C = 2n + 7$.
3. Substitute $n = 6$: $C = 2(6) + 7 = 12 + 7 = 19$ dollars.

Problem 3

1. For n tickets, the 6 dollars per unit contributes $6n$ dollars.
2. With no fixed fee, the total is $C = 6n$.
3. Substitute $n = 5$: $C = 6(5) + 0 = 30 + 0 = 30$ dollars.

Problem 4

1. For n sales, the 3 dollars per unit contributes $3n$ dollars.
2. The 10 dollars occurs once, giving $T = 3n + 10$.
3. Substitute $n = 8$: $T = 3(8) + 10 = 24 + 10 = 34$ dollars.

Problem 5

1. For n items, the 5 dollars per unit contributes $5n$ dollars.
2. The 4 dollars occurs once, giving $C = 5n + 4$.
3. Substitute $n = 2$: $C = 5(2) + 4 = 10 + 4 = 14$ dollars.

Problem 6

1. For n items, the 7 dollars per unit contributes $7n$ dollars.
2. The 3 dollars occurs once, giving $C = 7n + 3$.
3. Substitute $n = 4$: $C = 7(4) + 3 = 28 + 3 = 31$ dollars.

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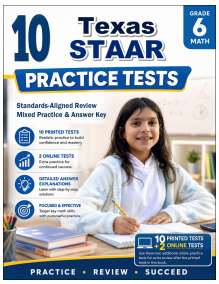

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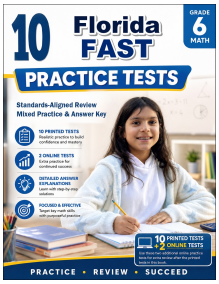

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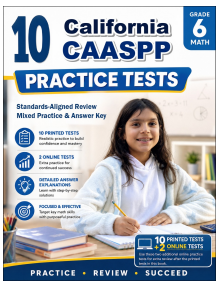

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