Variables in Real-World Problems

Variables in real-world problems: Mistakes and missing information

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 student writes $3(n + 8)$ for 3 dollars per item plus an 8-dollar fee. Repair the model. Let n count items; evaluate for $n = 5$.

2. The cost at 0 items is 2 dollars and each item adds 4. Recover the rule. Let n count items; evaluate for $n = 6$.

3. A student uses $9n + 2$ for a 9-dollar fee plus 2 per item. Correct the swapped roles. Let n count items; evaluate for $n = 7$.

4. Each added item raises cost by 5 dollars; zero items costs 6. Recover the model. Let n count items; evaluate for $n = 3$.

5. A student says $C = 8n$ gives a fixed cost of 8 dollars. Write the correct interpretation. Let n count items; evaluate for $n = 2$.

6. A 4-dollar fee is paid once, not per item. Correct a model charging it on every 6-dollar item. Let n count items; evaluate for $n = 5$.

Answer Key

1. $C = 3n + 8$ dollars; 23 dollars.
2. $C = 4n + 2$ dollars; 26 dollars.
3. $C = 2n + 9$ dollars; 23 dollars.
4. $C = 5n + 6$ dollars; 21 dollars.
5. $C = 8n$ dollars; 16 dollars.
6. $C = 6n + 4$ dollars; 34 dollars.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. For n items, the 3 dollars per unit contributes $3n$ dollars.
2. The 8 dollars occurs once, giving $C = 3n + 8$.
3. Substitute $n = 5$: $C = 3(5) + 8 = 15 + 8 = 23$ dollars.

Problem 2

1. For n items, the 4 dollars per unit contributes $4n$ dollars.
2. The 2 dollars occurs once, giving $C = 4n + 2$.
3. Substitute $n = 6$: $C = 4(6) + 2 = 24 + 2 = 26$ dollars.

Problem 3

1. For n items, the 2 dollars per unit contributes $2n$ dollars.
2. The 9 dollars occurs once, giving $C = 2n + 9$.
3. Substitute $n = 7$: $C = 2(7) + 9 = 14 + 9 = 23$ dollars.

Problem 4

1. For n items, the 5 dollars per unit contributes $5n$ dollars.
2. The 6 dollars occurs once, giving $C = 5n + 6$.
3. Substitute $n = 3$: $C = 5(3) + 6 = 15 + 6 = 21$ dollars.

Problem 5

1. For n items, the 8 dollars per unit contributes $8n$ dollars.
2. With no fixed fee, the total is $C = 8n$.
3. Substitute $n = 2$: $C = 8(2) + 0 = 16 + 0 = 16$ dollars.

Problem 6

1. For n items, the 6 dollars per unit contributes $6n$ dollars.
2. The 4 dollars occurs once, giving $C = 6n + 4$.
3. Substitute $n = 5$: $C = 6(5) + 4 = 30 + 4 = 34$ dollars.

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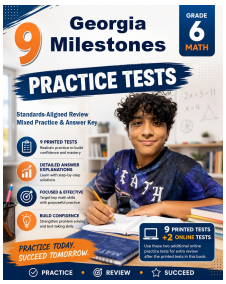

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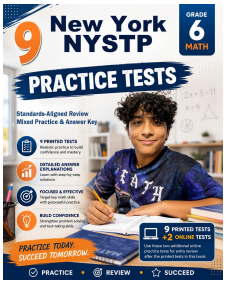

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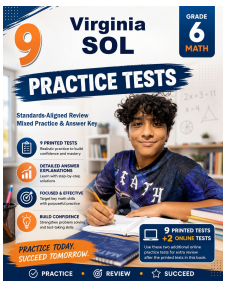

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