

### EXAMPLE 3 Use properties of multiplication

#### JUSTIFY STEPS

To justify a step, you name the property used. Sometimes a step is a calculation, as when you multiply 0.25 and  $-4$  in Example 3.

Find the product  $(-4x) \cdot 0.25$ . Justify your steps.

$$\begin{aligned}(-4x) \cdot 0.25 &= 0.25 \cdot (-4x) && \text{Commutative property of multiplication} \\ &= [0.25 \cdot (-4)]x && \text{Associative property of multiplication} \\ &= -1 \cdot x && \text{Product of 0.25 and } -4 \text{ is } -1. \\ &= -x && \text{Multiplicative property of } -1\end{aligned}$$

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### EXAMPLE 4 TAKS REASONING: Multi-Step Problem

#### READING

The average rate of change in elevation is the total change in elevation divided by the number of years that have passed.

**LAKES** In 1900 the elevation of Mono Lake in California was about 6416 feet. From 1900 to 1950, the average rate of change in elevation was about  $-0.12$  foot per year. From 1950 to 2000, the average rate of change was about  $-0.526$  foot per year. Approximate the elevation in 2000.



#### Solution

**STEP 1** Write a verbal model.

New elevation (feet)	=	Original elevation (feet)	+	Average rate of change (feet/year)	·	Time passed (years)
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**STEP 2** Calculate the elevation in 1950. Use the elevation in 1900 as the original elevation. The time span is  $1950 - 1900 = 50$  years.

$$\begin{aligned}\text{New elevation} &= 6416 + (-0.12)(50) && \text{Substitute values.} \\ &= 6416 + (-6) && \text{Multiply } -0.12 \text{ and } 50. \\ &= 6410 && \text{Add } 6416 \text{ and } -6.\end{aligned}$$

**STEP 3** Calculate the elevation in 2000. Use the elevation in 1950 as the original elevation. The time span is  $2000 - 1950 = 50$  years.

$$\begin{aligned}\text{New elevation} &= 6410 + (-0.526)(50) && \text{Substitute values.} \\ &= 6410 + (-26.3) && \text{Multiply } -0.526 \text{ and } 50. \\ &= 6383.7 && \text{Add } 6410 \text{ and } -26.3.\end{aligned}$$

► The elevation in 2000 was about 6383.7 feet above sea level.



#### GUIDED PRACTICE for Examples 3 and 4

Find the product. Justify your steps.

10.  $\frac{3}{10}(5y)$

11.  $0.8(-x)(-1)$

12.  $(-y)(-0.5)(-6)$

13. Using the data in Example 4, approximate the elevation of Mono Lake in 1925 and in 1965.