



EXAMPLE 6 **5.A.6 REASONING** Multi-step Problem

PAINT STORE You have a \$10 gift certificate to a paint store. The store is offering 15% off your entire purchase of any paints and painting supplies. You decide to purchase a \$30 can of paint and \$25 worth of painting supplies.



Use composition of functions to do the following:

- Find the sale price of your purchase when the \$10 gift certificate is applied before the 15% discount.
- Find the sale price of your purchase when the 15% discount is applied before the \$10 gift certificate.

Solution

STEP 1 Find the total amount of your purchase. The total amount for the paint and painting supplies is $\$30 + \$25 = \$55$.

STEP 2 Write functions for the discounts. Let x be the regular price, $f(x)$ be the price after the \$10 gift certificate is applied, and $g(x)$ be the price after the 15% discount is applied.

Function for \$10 gift certificate: $f(x) = x - 10$

Function for 15% discount: $g(x) = x - 0.15x = 0.85x$

STEP 3 Compose the functions.

The composition $g(f(x))$ represents the sale price when the \$10 gift certificate is applied before the 15% discount.

$$g(f(x)) = g(x - 10) = 0.85(x - 10)$$

The composition $f(g(x))$ represents the sale price when the 15% discount is applied before the \$10 gift certificate.

$$f(g(x)) = f(0.85x) = 0.85x - 10$$

STEP 4 Evaluate the functions $g(f(x))$ and $f(g(x))$ when $x = 55$.

$$g(f(55)) = 0.85(55 - 10) = 0.85(45) = \$38.25$$

$$f(g(55)) = 0.85(55) - 10 = 46.75 - 10 = \$36.75$$

- The sale price is \$38.25 when the \$10 gift certificate is applied before the 15% discount. The sale price is \$36.75 when the 15% discount is applied before the \$10 gift certificate.

at classzone.com



GUIDED PRACTICE for Examples 4, 5, and 6

Let $f(x) = 3x - 8$ and $g(x) = 2x^2$. Find the following.

8. $g(f(5))$ 9. $f(g(5))$ 10. $f(f(5))$ 11. $g(g(5))$

12. Let $f(x) = 2x^{-1}$ and $g(x) = 2x + 7$. Find $f(g(x))$, $g(f(x))$, and $f(f(x))$. Then state the domain of each composition.

13. **WHAT IF?** In Example 6, how do your answers change if the gift certificate to the paint store is \$15 and the store discount is 20%?