**Function Operations & Composition**

*Let* $f$ *and* $g$ *be any two functions. When you perform operations of* $f$ *and* $g$ *the new function* $h$ *is obtained.*

<table>
<thead>
<tr>
<th>Operation</th>
<th>Definition</th>
<th>Example</th>
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</thead>
<tbody>
<tr>
<td><strong>Addition</strong></td>
<td>$h(x) = f(x) + g(x)$</td>
<td>Let $f(x) = 5x$ and $g(x) = x + 2$</td>
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<tr>
<td><strong>Subtraction</strong></td>
<td>$h(x) = f(x) - g(x)$</td>
<td></td>
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<tr>
<td><strong>Multiplication</strong></td>
<td>$h(x) = f(x) \cdot g(x)$</td>
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<tr>
<td><strong>Division</strong></td>
<td>$h(x) = \frac{f(x)}{g(x)}$ \text{ RESTRICTIONS: x-values that } g(x) = 0</td>
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**A. Perform each operation. Find the domain of each new function.**

1. Let $f(x) = 4x^\frac{1}{3}$ and $g(x) = -9x^\frac{1}{3}$.
   a. $h(x) = f(x) + g(x)$
   b. $h(x) = f(x) - g(x)$

2. Let $f(x) = 6x$ and $g(x) = x^3$.
   a. $h(x) = f(x) \cdot g(x)$
   b. $h(x) = \frac{f(x)}{g(x)}$
B. Perform each operation.

1. Let \( f(x) = 2x - 7 \) and \( g(x) = x^2 + 4 \).
   a. Evaluate \( g(f(3)) \).
   b. \( f(g(2y)) \)

C. Perform each operation. Find the domain of each.

1. Let \( f(x) = 4x^{-1} \) and \( g(x) = 5x - 2 \).
   a. \( f(g(x)) \)
   b. \( g(f(x)) \)
   c. \( f(f(x)) \)
   d. \( f(g(x + 1)) \)

D. Percentages & Purchases

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

Find the sale price when the $10 gift certificate is applied before the 15% discount.

Find the sale price when 15% discount is taken off before your $10 gift card.

Which is the better buy?