

$$\begin{array}{ccccc}
 \Omega(A) & \hookrightarrow & P_A & \twoheadrightarrow & A \\
 \downarrow \Omega(g) & & \downarrow p_g & & \downarrow g \\
 \Omega(B) & \hookrightarrow & P_B & \twoheadrightarrow & B \\
 \downarrow \Omega(f) & & \downarrow p_f & & \downarrow f \\
 \Omega(C) & \hookrightarrow & P_C & \twoheadrightarrow & C
 \end{array}$$

Commutative diagram illustrating the relationship between the Omega functor, projective resolutions, and the composition of maps f and g .

The diagram shows three rows representing the objects A , B , and C . The top row is $\Omega(A) \hookrightarrow P_A \twoheadrightarrow A$, the middle row is $\Omega(B) \hookrightarrow P_B \twoheadrightarrow B$, and the bottom row is $\Omega(C) \hookrightarrow P_C \twoheadrightarrow C$.

Vertical arrows connect the rows: $\Omega(g): \Omega(A) \rightarrow \Omega(B)$, $\Omega(f): \Omega(B) \rightarrow \Omega(C)$, $p_g: P_A \rightarrow P_B$, $p_f: P_B \rightarrow P_C$, $g: A \rightarrow B$, and $f: B \rightarrow C$.

Curved red arrows indicate the composition of maps: $\Omega(f \circ g): \Omega(A) \rightarrow \Omega(C)$ (labeled $\Omega(f \circ g)$ on the left), $p_{f \circ g}: P_A \rightarrow P_C$ (labeled $p_{f \circ g}$ in the center), and $f \circ g: A \rightarrow C$ (labeled $f \circ g$ on the right).