

Specific Expectations

These expectations are common to the Functions and Relations course and the Functions course.

- OC1.01 solve first-degree inequalities and represent the solutions on number lines
- OC2.01 define the term function
- OC2.02 demonstrate facility in the use of function notation for substituting into and evaluating functions
- OC2.04 explain the relationship between a function and its inverse (i.e., symmetry of their graphs in the line $y = x$; the interchange of x and y in the equation of the function; the interchanges of the domain and range), using examples drawn from linear and quadratic functions, and from the functions

$$f(x) = \sqrt{x} \text{ and } f(x) = \frac{1}{x}$$

- OC2.05 represent inverse functions, using function notation, where appropriate
- OC2.06 represent transformations (e.g., translations, reflections, stretches) of the functions defined by $f(x) = x$, $f(x) = x^2$, $f(x) = \sqrt{x}$, $f(x) = \sin x$, and $f(x) = \cos x$, using function notation
- OC2.07 describe, by interpreting function notation, the relationship between the graph of a function and its image under one or more transformations

What “big ideas” should students develop in this chapter?

Students who have successfully completed the work of this chapter and who understand the essential concepts and procedures will know the following:

- A function is a relation with a specific characteristic: each element of the domain predicts a specific element of the range.
- The inverse of a relation is the image under reflection in the line $y = x$ and may or may not be a function.
- Transformations can be applied to functions to translate, reflect, stretch, or dilate the function and its graph.
- $f(x)$ and $f^{-1}(x)$ denote a function and its inverse, respectively.
- The domain of a function becomes the range of the inverse and the range of the function becomes the domain of the inverse.
- Inequalities describe restrictions on the range, or domain, of a function.
- Inequality relations can be graphed but they are not functions.

What do students already know about the work of this chapter?

In grade 10 (academic), students have

- explored many relations using tables, algebraic models, graphs, and verbal descriptions
- identified the effect of simple transformations—translations, reflections, and vertical stretches—on the graph and the equation of a parabola
- explained the roles of a , h , k in the graph of $y = a(x - h)^2 + k$
- completed the square to rewrite the equation of a quadratic function
- understood the connection between the equation and corresponding graph of a quadratic function and created hand-drawn sketches
- identified dependent and independent variables
- manipulated equations