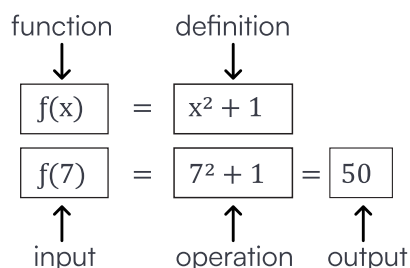


Algebra

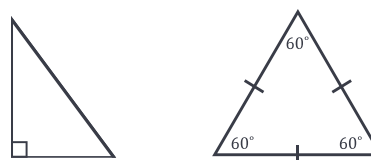
- ✓ $a^n = \underbrace{a \times a \times \cdots \times a}_{n \text{ times}}$
- ✓ $y = \log_a x \iff x = a^y$
- ✓ $\ln x = \log_e x$
- ✓ $i = \sqrt{-1}$
- ✓ A function takes an input, through an operation, to an output:



- ✓ **Composition:** $f(g(x)) = (f \circ g)(x)$
- ✓ **Custom operations**, such as $x \# y$ or $x @ y$, are functions of two inputs, $f(x, y)$
- ✓ $f^{-1}(x)$ is the inverse of $f(x)$
- ✓ **Piecewise function:** $f(x) = \begin{cases} x^2 & x \geq 0 \\ -x & x < 0 \end{cases}$, two operations chosen by the input's value
- ✓ **Floor:** $\lfloor x \rfloor$, the greatest integer $\leq x$. **Ceiling:** $\lceil x \rceil$, the smallest integer $\geq x$

Geometry

- ✓ $\overline{AB}$ is the segment from A to B ; AB alone is its length
- ✓ $\angle ABC$ is the angle at vertex B
- ✓ A small square in a corner marks a right angle; matching tick marks through sides mean the sides are equal



- ✓ (x, y) is an ordered pair: the x value, then the y value, of a point on the coordinate plane
- ✓ $\sin^{-1} x$, $\cos^{-1} x$, $\tan^{-1} x$ are the inverse trig functions, also written arcsin, arccos, arctan

Number theory

- ✓ $a \equiv b \pmod{n}$: a and b leave the same remainder when divided by n , so n divides $a - b$
- ✓ $\gcd(a, b)$: the greatest common divisor of a and b
- ✓ $\text{lcm}(a, b)$: the least common multiple of a and b
- ✓ $[a, b]$: the closed interval from a to b , inclusive
- ✓ (a, b) : the open interval between a and b , excluding both
- ✓ **Summation:** $\sum_{k=1}^n a_k = a_1 + a_2 + \cdots + a_n$

Counting and probability

- ✓ $n! = n(n-1)(n-2) \cdots 1$
- ✓ ${}_nC_k = \binom{n}{k} = \frac{n!}{k!(n-k)!}$
- ✓ $P(A)$: the probability of event A
- ✓ $\cap$ (intersection): the elements shared by all the sets
- ✓ $\cup$ (union): the elements in any of the sets
- ✓ $\emptyset$ (empty set): a set with no elements