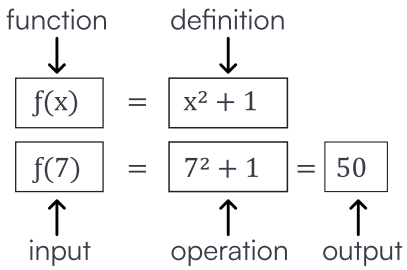
Achievable

AMC 10/12 DUMP SHEET

Notations

Algebra

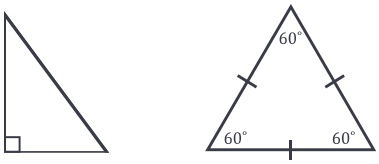
- $a^n = \underbrace{a \times a \times \cdots \times a}_{n \text{ times}}$
- $y = \log_a x \iff x = a^y$
- $\ln x = \log_e x$
- $i = \sqrt{-1}$
- A function takes an input, through an operation, to an output:



- **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
- $\operatorname{lcm}(a, b)$: 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
- $\varnothing$ (empty set): a set with no elements