Achievable

# Glossary of notations

## AMC 10/12 DUMP SHEET

## Algebra

- $a^n = \underbrace{a \times a \times \cdots \times a}_{\text{n times}}$
- $y = \log_a x \iff x = a^y$
- $\ln x = \log_e x$
- $i = \sqrt{-1}$
- function → definition

$$\boxed{f(x)} = \boxed{x^2 + 1}$$

$$\boxed{f(7)} = \boxed{7^2 + 1} = \boxed{50}$$

input → operation → output

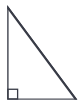
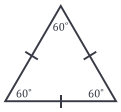
- $f(g(x)) = (f \circ g)(x)$
- $f(x, y) = (x \# y) = (x @ y)$
- $f^{-1}(x)$ is the inverse of $f(x)$
- $$f(x) = \begin{cases} x^2 & x \geq 0 \\ -x & x < 0 \end{cases}$$

This is a piecewise function that describes two different operations that are chosen based on the value of the input

- $[x] =$ greatest integer $\leq x$

  $[x] =$ smallest integer $\geq x$

## Geometry

- $\overline{AB}$ or AB represent a line from point A to point B
- $\angle ABC$ means the angle at vertex $B$
-  The small square represents a right angle
- 

The short lines going through each side indicates that each line is the same length
- **(*x*,y)** represents an ordered pair where the first number is the ***x*** value and the second is the **y** value of a specific point on the cartesian plane
- **$\sin^{-1}(x)$, $\cos^{-1}(x)$ and $\tan^{-1}(x)$** are inverse trig functions otherwise known as **arcsin, arccos,** and **arctan**

## Number theory

- $a = b \pmod n$ means when ***a*** is divided by ***n*** the remainder is ***b***
- ***gdc(a,b)*** means the greatest common denominator of ***a*** and ***b***
- ***lcm(a,b)*** means the least common multiple of ***a*** and ***b***
- **[*a*, *b*]** is a closed interval representing anything between ***a*** and ***b***, inclusive
- **(*a*,*b*)** is an open interval representing anything between, but not including, ***a*** and ***b***
- Summation notation $\sum_{k=1}^{n} a_k = a_1 + a_2 + \ldots + a_n$

## Counting and probability

- $n! = n * (n\text{-}1) * (n\text{-}2) * (n\text{-}3) \ldots\ldots * 1$
- $nCk = \binom{n}{k} = \frac{n!}{k!\,(n - k)!}$
- $P(A)$ means "probability of event $A$"
- ⋂(intersection) - the intersection of any two or more sets is the elements shared in all sets
- ⋃ (union) - the union of any two or more sets is the elements present in any set
- ∅ (empty set) - this means that there is no elements within the set