

Subsets of Real numbers

Real Numbers



Rational numbers

($\frac{1}{2}$, 0.5, $0.\bar{9}$, $0.0\bar{7}$, 1, -2, 0)

Irrational numbers

($\sqrt{2}$, π , $-\sqrt{3}$)



Integers (..., -3, -2, -1, 0, 1, 2, ...)



Whole numbers (0, 1, 2, ...)



Natural (counting) numbers (1, 2, 3, ...)

Arithmetic & Geometric Sequences

Arithmetic

$a, a+d, a+2d, \dots$

a = first term

d = common difference

$$d = u_{n+1} - u_n \quad \text{difference of 2 consecutive terms}$$

$$\begin{cases} u_1 = a \\ u_n = u_{n-1} + d \end{cases} \quad \text{(recursive formula)}$$

$$u_n = a + (n-1)d \quad \text{(explicit formula)}$$

$$S_n = \sum_{k=1}^n u_k = u_1 + \dots + u_n$$

$$S_n = \frac{n}{2} (u_1 + u_n)$$

or $\frac{\# \text{ of terms}}{2} (\text{first term} + \text{last term})$

Geometric

a, ar, ar^2, \dots

a = first term

r = common ratio

$$r = \frac{u_{n+1}}{u_n} \quad \text{ratio of 2 consecutive terms}$$

$$\begin{cases} u_1 = a \\ u_n = u_{n-1} \cdot r \end{cases} \quad \text{(recursive formula)}$$

$$u_n = a \cdot r^{n-1} \quad \text{(explicit formula)}$$

$$S_n = u_1 \left(\frac{1-r^n}{1-r} \right) \quad \# \text{ of terms}$$

first term $\cdot \frac{1 - \text{ratio}}{1 - \text{ratio}}$

Lines

$$\boxed{y = mx + b}$$

↓ Slope ↓ y-intercept

slope-intercept form

$$m = \frac{\text{rise}}{\text{run}} = \frac{\text{change in } y}{\text{change in } x} = \frac{y_2 - y_1}{x_2 - x_1}$$

* Given (1) $y = m_1x + b_1$ and (2) $y = m_2x + b_2$

If (1) & (2) parallel, then $\boxed{m_1 = m_2}$ (eg. $y = 2x + 3$
 $y = 2x - 5$)

(Two parallel lines have the same slope)

(1) & (2) perpendicular, $\boxed{m_1 \cdot m_2 = -1}$ (eg. $y = -3x + 1$
 $y = \frac{1}{3}x - 5$)

Point-slope form

Given (x_1, y_1) & slope m

$$\boxed{y - y_1 = m(x - x_1)}$$

EX (2, 3) $m = \frac{1}{2}$

$$y - 3 = \frac{1}{2}(x - 2)$$