

Arithmetic Sets

- Number of organs

$$n = \frac{a_n - a_1}{\text{difference}} + 1$$

Conversion Ratios

- 12 Inch = 1 foot
- 3 feet = 1 yard
- 1760 yard = 1 mile
- 5280 feet = 1 mile
- 1 pound = 16 ounces

Equations

Quadratic Equations (short)

- If $a = 1$ $ax^2 + bx + c = 0$
 $\begin{matrix} \swarrow & \searrow \\ R+T & R*T \\ (X+T)(X+R)=0 \\ X = -T, -R \end{matrix}$

General

$$\frac{a-b}{b-a} = (-1)$$

$$\frac{1}{\sqrt{x}-a} = \frac{\sqrt{x}+a}{(\sqrt{x}-a)(\sqrt{x}+a)}$$

$$\frac{1}{6} = 0.1667 \quad \frac{1}{13} = 0.076923$$

$$\frac{1}{12} = 0.08333 \quad \frac{1}{14} = 0.0714$$

$$\frac{1}{7} = 0.142857 \quad \frac{1}{15} = 0.0667$$

$$\frac{1}{9} = 0.111111 \quad \frac{1}{16} = 0.0625$$

- Non arithmetic sets:** check extremes, draw horizontally.
- Reciprocal:** הופכי
- Terminating** – Denominator contains only 2, 5 or either as primes, after cancellation. (cannot contain other primes)

Ratio

- To check what happened to the ratio (inc/dec):** set the addition to each side of the ratio as the numerator of the fraction in which the denominator is the respective side. Compare new fractions.
- Ratio + GCD:**
 - Cancel
 - Multiply by GCD
 - Find real values.

Work Rate

- Same work rates:**

$$\frac{\text{Work}_1}{\text{Time}_1 * \text{Workers}_1} = \frac{\text{Work}_2}{\text{Time}_2 * \text{Workers}_2}$$
- Different work rates:**
 - find common denominator
 - compare according to question

Against Each Other

$$\frac{W_1}{T_1} - \frac{W_2}{T_2}$$

Multiple Workers

$$\frac{Q_1 \times W_1}{T_1} + \frac{Q_2 \times W_2}{T_2}$$

Motion & Speed *** Units

$$\overrightarrow{\hspace{1cm}} \quad D = (V_1 - V_2) \times T$$

$$\overleftarrow{\hspace{1cm}} \quad D = (V_1 + V_2) \times T$$

$$\overleftrightarrow{\hspace{1cm}} \quad D = (V_1 + V_2) \times T$$

- 1. Find common denominator
- 2. Compare numerators

$$\bar{V} = \frac{\sum D}{\sum T}$$

Geometry

- Complementary:** $\sum = 90^\circ$
- Supplementary:** $\sum = 180^\circ$
- Pita Triplets:** [3,4,5] [5,12,13] [8,15,17] [7,24,25]
- Golden Ratio:** $X: \sqrt{3}x: 2x$
- Silver Ratio:** $X: X: \sqrt{2}x$
- Equilateral's Area:** $\rightarrow \frac{\sqrt{3}a^2}{4}$
- Arc:** $\frac{\text{central}^\circ}{360} \times 2\pi r$
- Sector:** $\frac{\text{central}^\circ}{360} \times \pi r^2$
- $\sum \text{Poly Inner} = 180 * (n - 2)$
- $a^2 + b^2 > c^2 \rightarrow$ angle between a & b < 90



- Cylinder Vol.:** $\text{height} * \pi r^2$
- Cylinder Area:** $\text{height} * 2\pi r + 2\pi r^2$



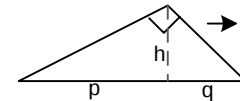
- Cone Vol:** $\frac{\text{height} * \pi r^2}{3}$



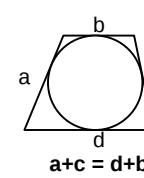
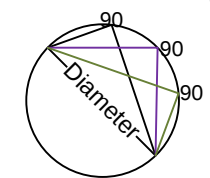
- Cone in Cylinder Vol. Ratio:** 1/3



- Sphere Vol.:** $\frac{4\pi r^3}{3}$
- Sphere Area:** $4\pi r^2$



$$p \times q = h^2$$



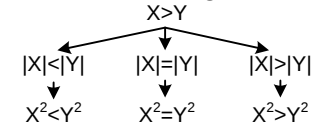
- In similar triangles** the square of the ratio between the length of their sides is equal to the ratio between their areas

$$4 \left(\frac{2}{4} \right)^2 = \frac{2x}{\frac{4 \times 5}{2}}$$

Inequalities

In inequalities It's allowed/disallowed to:

- +,- allowed 😊
- X, / - by (-): reverse
- X, / - by unknown not allowed ❌
- Raise odd ^ power – allowed 😊
- Raise even ^ if both sides pos 😊
- Raise even ^ if both sides neg: reverse
- Raise even ^ 1 neg 1 odd



Extract Roots:

- Neg number, even roots** ❌
- Pos number, even roots,** 😊 (2 ans)
- Odd roots** 😊

Absolute Val = Distance

- $|X-3| = \text{Dis. Of } X-3 \text{ from } 0 \text{ is LT5}$
- $|X-Y| > 5 = \text{Dis. Of } x \text{ from } y \text{ is BT5}$
- Can be opened twice (+,-)

Mixtures

$$\frac{\text{Vol of } x}{\sum \text{vol}} = \text{concentration of } x$$

$$V_1 \times C_1 + V_2 \times C_2 = (V_1 + V_2)C_T$$

- Concentration of solvent = 0%**
- Concentration of soluble = 100%**

Coordinate Geometry

- Lines that don't intersect** – same slope (slope can be compared directly)
- Product of perpendicular slopes = -1**
- $d = \sqrt{(y_1 - y_2)^2 + (x_1 - x_2)^2}$
- $m = \frac{y_1 - y_2}{x_1 - x_2}$
- $(y_1 - y_2) = m(x_1 - x_2)$
- $r^2 = (x_1 - x_2)^2 + (y_1 - y_2)^2 \therefore [\text{origin} = (x_2, y_2)]$

$$\begin{pmatrix} 2 & 1 \\ 3 & 4 \end{pmatrix}$$

Combinatory

☐ OR = + And = x

Permutations

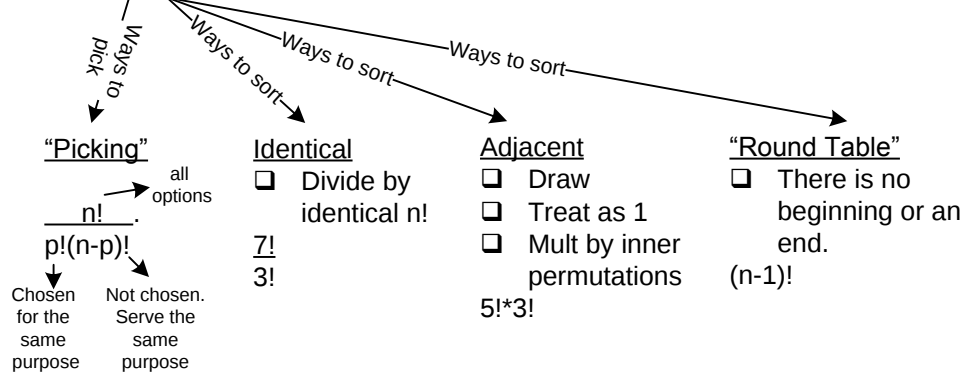
With Repetitions
(material reused)

___ x ___ x ___

- ☐ All Cases
- ☐ Bad Cases
- ☐ Good Cases

Without Repetitions
(no reuse)

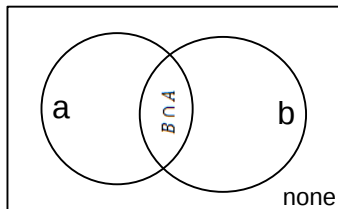
$n!$



☐ **Subset size N** => Ways to pick N + ways to pick N-1 + ways to pick N-2 ... ways to pick N-N+1

Sets/Vann

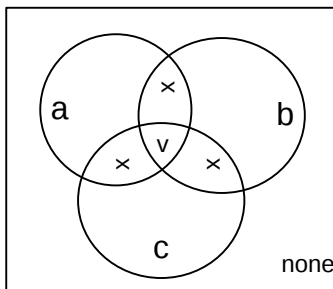
Total



T-None = A+B-both

$B \cap A$ = both = intersection
 $B \cup A$ = A+B-both = union

Total

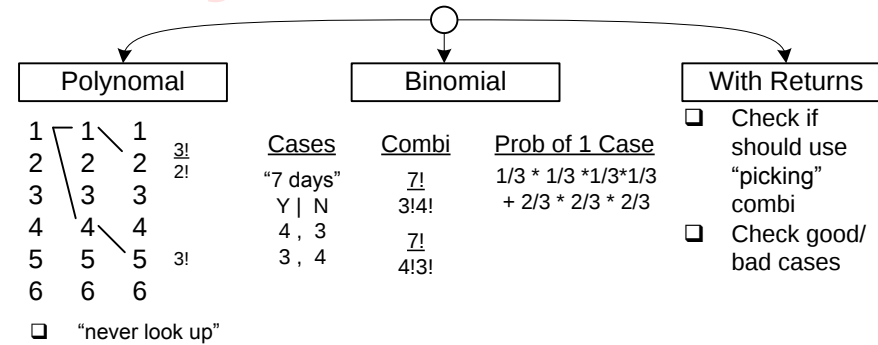


T-None = A+B+C-2V-3X

☐ Subtract $(n-1) \cdot V$, while n = the number of groups

Probability

What we want.
All possibilities



Reminders

- ☐ **Allowed between quotients:** +, -, x
- ☐ A reminder is always taken from the left side of the multiplier.
- ☐ **questions with same quotient and different denominators**, find first common reminder and then find LCM to find the fixed gap between the common reminder and the other possible values.

Others

- ☐ **Number of factors to a number:** Add one to each of the powers of the prime factors that constitute the number. Multiply the results
- ☐ **Dec/Inc * 100 = % Dec/Inc original**
- ☐ **Computed semiannually** = $\frac{1}{2}$ interest every 6 months
- ☐ **For A,B: GCF * LCM = A*B**
- ☐ Sum of consecutive numbers from -X to X+5, disregard -X to X (=0).
- ☐ When multiplying a number by itself, the units digit cannot be 2,3,7 or 8. any integer ending with these numbers has no **integer** root.
- ☐ Use $t = z^x$ declarations for complicated equations

Consecutive Integers

Product of:

- ☐ 3 cons is divisible by 3!
- ☐ 4 cons is divisible by 4!
- ☐ x cons is divisible by x!

Sum of:

- ☐ 3 cons is divisible by 3 (odd)
- ☐ 4 cons is is not divisible by 4 (even)

Averages

- ☐ **Remember – the sum of differences = 0**
- ☐ In Data Sufficiency: only the ratio between the number of people is necessary in order to find the combined average.
- ☐ **Accumulated Change** = Change to Average New Total Organs