RONB

EDU

Grade 10

Compulsory Mathematics

IMPORTANT FORMULA

CHEAT SHEETS

Ronb Education(RONB Edu)

SETS

$$n(P \cup Q) = n(P) + n(Q) - n(P \cap Q)$$

$$n(P \cap Q) = n(P) + n(Q) - n(P \cup Q)$$

$$n(U) = n(P \cup Q) + n(P \cup Q)'$$

$$n(P \cup Q)' = n(U) - n(P \cup Q)$$

$$n(P \cup Q \cup R) = n(P) + n(Q) + n(R) - n(P \cap Q) - n(Q \cap R) - n(R \cap P) + n(P \cap Q \cap R)$$

$$n(P \cap Q \cap R) = n(P \cup Q \cup R) - n(P) - n(Q) - n(R) + n(P \cap Q) + n(Q \cap R) + n(R \cap P)$$

Profit/Loss and MP, VAT and Discount

Profit = S.P - C.P and Profit = Profit% of C.P

Loss = C.P - S.P and Loss = Loss% of C.P

$$\text{Profit\%} = \frac{\text{Profit}}{\text{C.P}} * 100\%$$

$$\text{Loss\%} = \frac{\text{Loss}}{\text{C.P}} * 100\%$$

(Note: It is all about C.P when you calculate profit% or loss%)

Discount = M.P - S.P1 and Discount = Discount% of M.P

VAT = S.P2 - S.P1 and VAT = VAT% of S.P1

S.P1 = M.P- Discount

S.P2 = S.P1 + VAT

(Note: VAT is always added and Discount is subtracted)

S.P = Selling Price C.P = Cost Price
M.P = Marked Price VAT = Value Added Tax
S.P1 = Selling price after discount S.P2 = Selling price after VAT and discount

Simple and Compound Interest

$$S.I = \frac{P*T*R}{100}$$

$$\text{Compound Interest} = P\left(1 + \frac{R}{100}\right)^{T}$$

$$\text{Compound Interest(semi-annually)} = P\left(1 + \frac{R}{200}\right)^{2T}$$

$$\text{Compound Amount} = P\left(\left(1 + \frac{R}{100}\right)^{T} + 1\right)$$

$$\text{Compound Amount (semi-annually)} = P\left(\left(1 + \frac{R}{200}\right)^{2T} + 1\right)$$

S.I = Simple Interest
P = Principle
T = Time (in years)
R = Rate (in %)

Population Growth and Population Depreciation

$$\text{Population increased (G)} = \frac{P*T*R}{100}$$

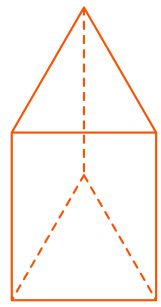
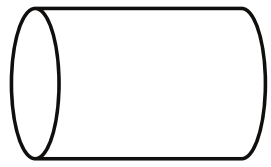
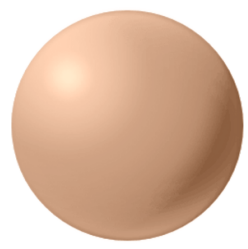
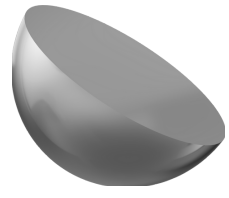
New Population = P + G

$$\text{Depreciation} = Pi\left(1 - \frac{R}{100}\right)^{T}$$

$$\text{Amount after depreciation} = Pi\left(1 - \left(1 - \frac{R}{100}\right)^{T}\right)$$

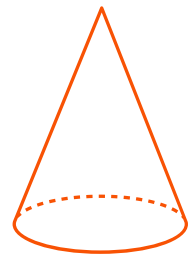
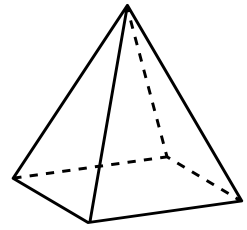
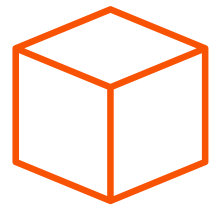
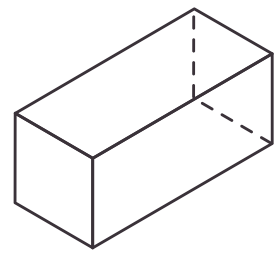
P = Previous Population
Pi = Original Price
T = Time (in years)
R = Rate (in %)

Mensuration

Shapes		L.S.A or C.S.A	T.S.A	Volume
Prism		P*l P = perimeter of base l = length	P*l + 2A A = Area of base	A*h
Cylinder		$2\pi rh$	$2\pi rh + 2\pi r^2$ $=2\pi r\,(r + h)$	$\pi r^2 h$
Sphere		$4\pi r^2$	$4\pi r^2$	$\frac{4}{3}\pi r^3$
Hemisphere		$2\pi r^2$	$3\pi r^2$	$\frac{2}{3}\pi r^3$

Note: CSA is calculated for shapes having a curved surface.

Mensuration

Shapes		L.S.A or C.S.A	T.S.A	Volume
Cone		πrl	$\pi r^2 + \pi rl$ $=\pi r\,(r + l)$	$\frac{1}{3}\pi r^2 h$
Pyramid		$2al$	$2al + a^2$ $= 2a(l + a)$	$\frac{1}{3}a^2 h$
Cube		$4l^2$	$6l^2$	l^3
Cuboid		$2h(l + b)$	$2(lb + bh + lh)$	lbh

a = length of base, r = radius, l = slant height, h = height

Note: CSA is calculated for shapes having a curved surface.

Algebra

$(a - b)^2 = a^2 - 2ab + b^2$ $(a + b)^2 = a^2 + 2ab + b^2$

$(a - b)(a+b) = a^2 - b^2$

$(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$

$(a - b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$

$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$

$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$

$a^3 + b^3 = (a + b)^3 - 3ab(a + b)$

$a^3 - b^3 = (a - b)^3 + 3ab(a - b)$

Area of Triangle

Area = $\frac{1}{2}$ b*h where, b = base and h = height

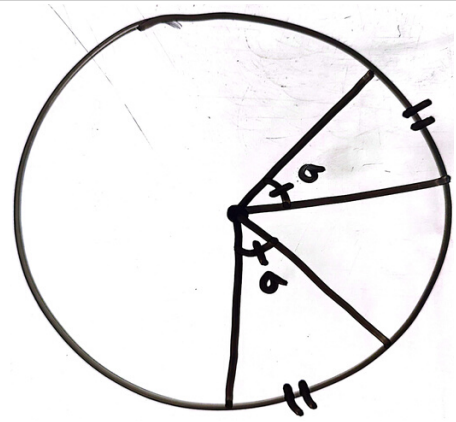
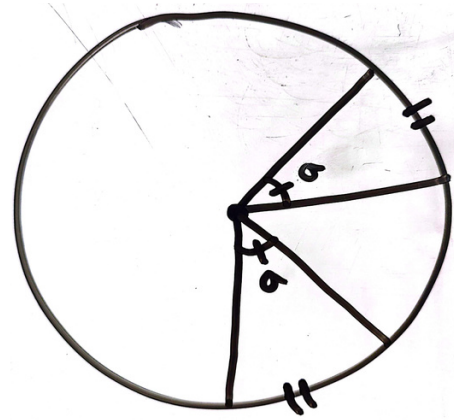
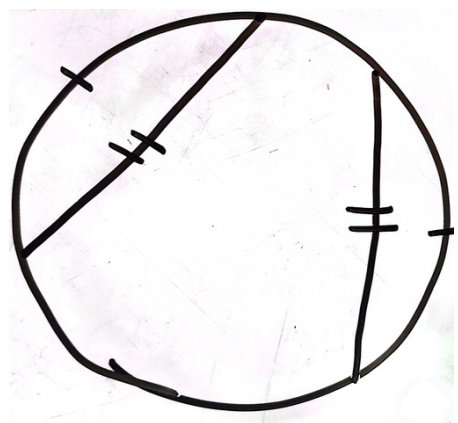
Area = $\sqrt{s(s-a)(s-b)(s-c)}$ where, $s = \frac{a+b+c}{2}$

Area of Equilateral Triangle = $\frac{\sqrt{3}}{4}a^2$ where, a = length of either side

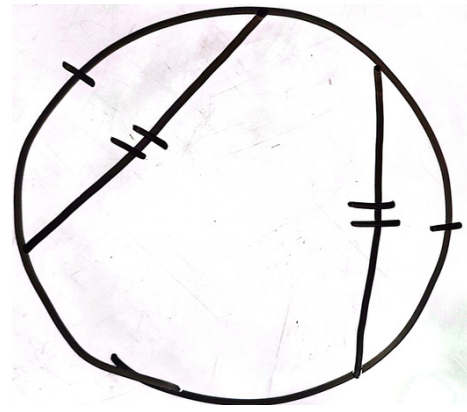
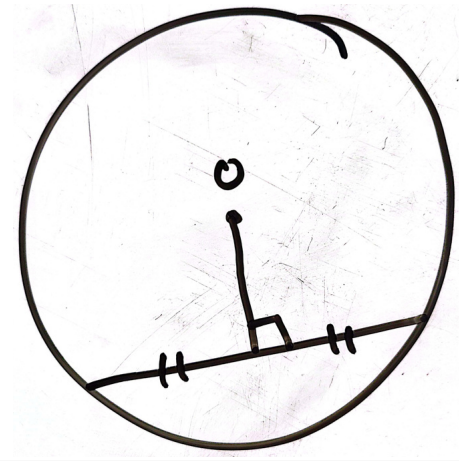
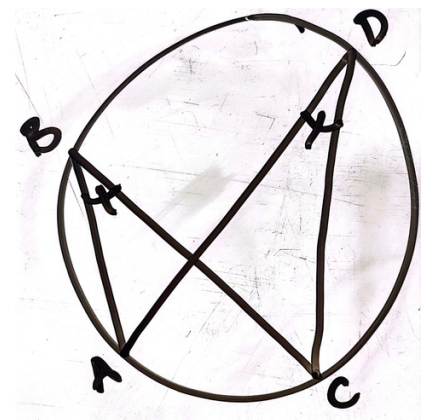
Area of Isosceles Triangle = $\frac{b}{2}\sqrt{a^2 - \frac{b^2}{4}}$

where, a = common side
b = length of base

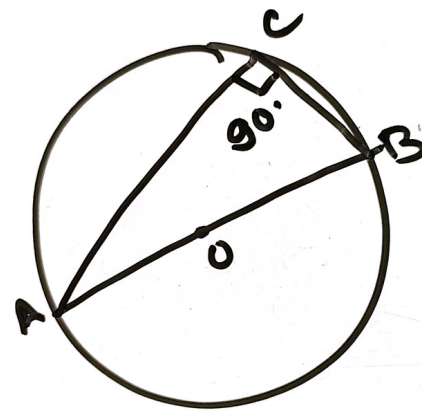
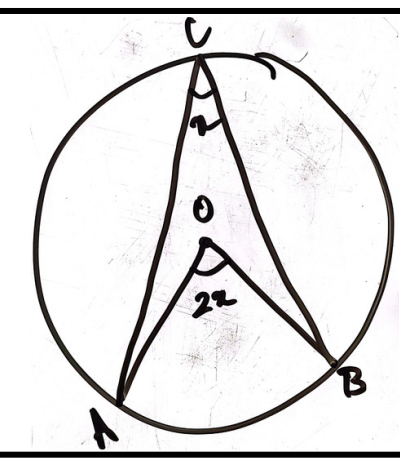
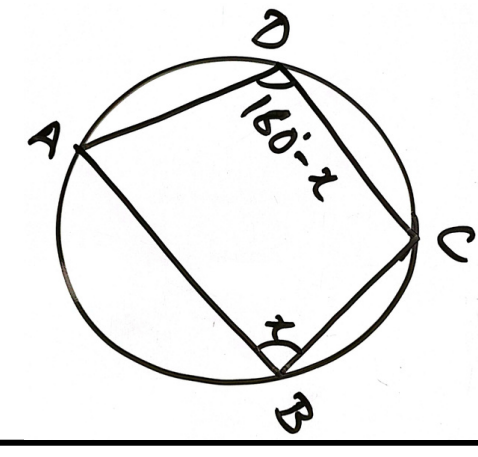
Circle Theorems

S.N	Statement	Figure
1.	**Theorem 1 : Equal arcs of a circle subtend equal angles, at the center of the circle.**	
2.	**Converse of Theorem 1 : If two angles subtended at the center, by two arcs are equal, then the arcs are of equal length.**	
3.	**Theorem 2 : Equal chords of a circle subtend equal arcs.**	

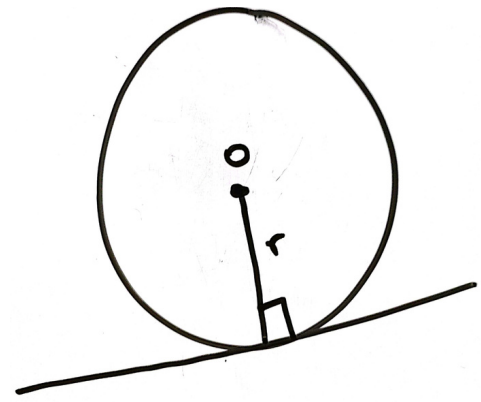
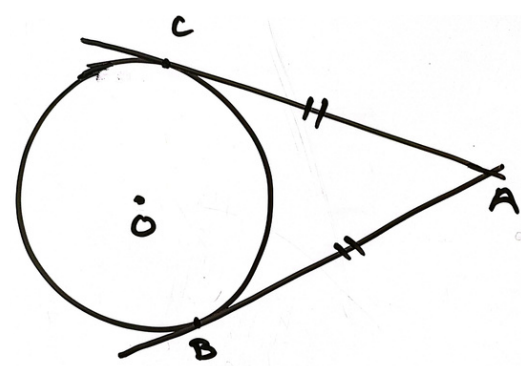
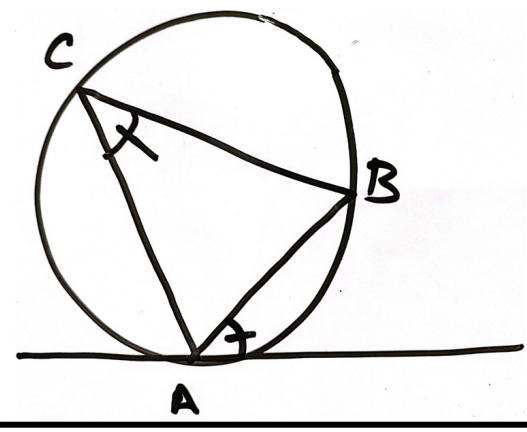
Circle Theorems

S.N	Statement	Figure
4.	**Converse of Theorem 2 : Equal arcs of a circle subtend equal chords.**	
5.	**Theorem 3 : The perpendicular to a chord bisects the chord if drawn from the center of the circle.**	
6.	**Theorem 4 : Inscribed angles standing on the same base are equal.**	

Circle Theorems

S.N	Statement	Figure
7.	Theorem 5 : Angle formed by the semicircle opposite to the diameter is 90 degrees.	
8.	Theorem 6 : Inscribed angle is half of the center angle standing on the same base.	
9.	Theorem 7 : Opposite angles in a cyclic quadrilateral is supplementary.	

Circle Theorems (Tangents)

S.N	Statement	Figure
1.	Theorem 1 : The tangent to the circle at any point is the perpendicular to the radius of the circle that passes through the point of contact.	
2.	Theorem 2 : The lengths of tangents drawn from an external point to a circle are equal.	
3.	Theorem 3 : Exterior angle formed by the tangent with a chord is equal to the opposite interior angle of the chord.	

Statistics

$$\text{Mean} = \frac{\sum x}{n} \quad \text{(Individual series)}$$

$$\text{Mean} = \frac{\sum fx}{N} \quad \text{(Discrete and Continuous series)}$$

$$\text{Median} = \frac{N+1}{2} \text{ th term} \quad \text{(Individual series)}$$

$$\text{Median} = \frac{N+1}{2} \text{ th term} \quad \text{(Discrete series)}$$

$$Q1 \text{ (Lower Quartile)} = \frac{N+1}{4} \text{ th term} \quad \text{(Discrete series)}$$

$$Q3 \text{ (Upper Quartile)} = 3*\left(\frac{N+1}{4}\right) \text{ th term} \quad \text{(Discrete series)}$$

Note: For Discrete Series, Median is the value of corresponding x which has c.f just greater than the value obtained after the median calculation. (Similar with Q1 and Q3)

Statistics

Median class = $\frac{N}{2}$ th term (Continuous series)

Q1 class = $\frac{N}{4}$ th term (Continuous series)

Q3 class = $\frac{3N}{4}$ th term (Continuous series)

Note: For Continuous Series, Median class is the value of the corresponding range of x which has c.f just greater than the value obtained after the median class calculation. (Similar with Q1 and Q3)

$$\text{Median} = l + \left(\frac{\frac{N}{2} - cf}{f}\right) * h \quad \text{(Continuous series)}$$

$$Q1 = l + \left(\frac{\frac{N}{4} - cf}{f}\right) * h \quad \text{(Continuous series)}$$

Statistics

$$Q3 = l + \left(\frac{\frac{3N}{4} - cf}{f}\right) * h \qquad \text{(Continuous series)}$$

Here, l = lowest value of the range
h = length of range
f = corresponding value of frequency
c.f = value of c.f one above the corresponding value

Mode is the value of frequency which occurs the most.

$$\text{Standard Deviation}(\sigma) = \sqrt{\left(\frac{X^2}{N}\right) - \left(\frac{X}{N}\right)^2}$$

$$\text{Variance } (V) = \sigma^2$$

Trigonometry

Reciprocal Identity

$\text{cosec}\ \theta = 1/\sin\theta$

$\sec\theta = 1/\cos\theta$

$\cot\theta = 1/\tan\theta$

$\sin\theta = 1/\text{cosec}\ \theta$

$\cos\theta = 1/\sec\theta$

$\tan\theta = 1/\cot\theta$

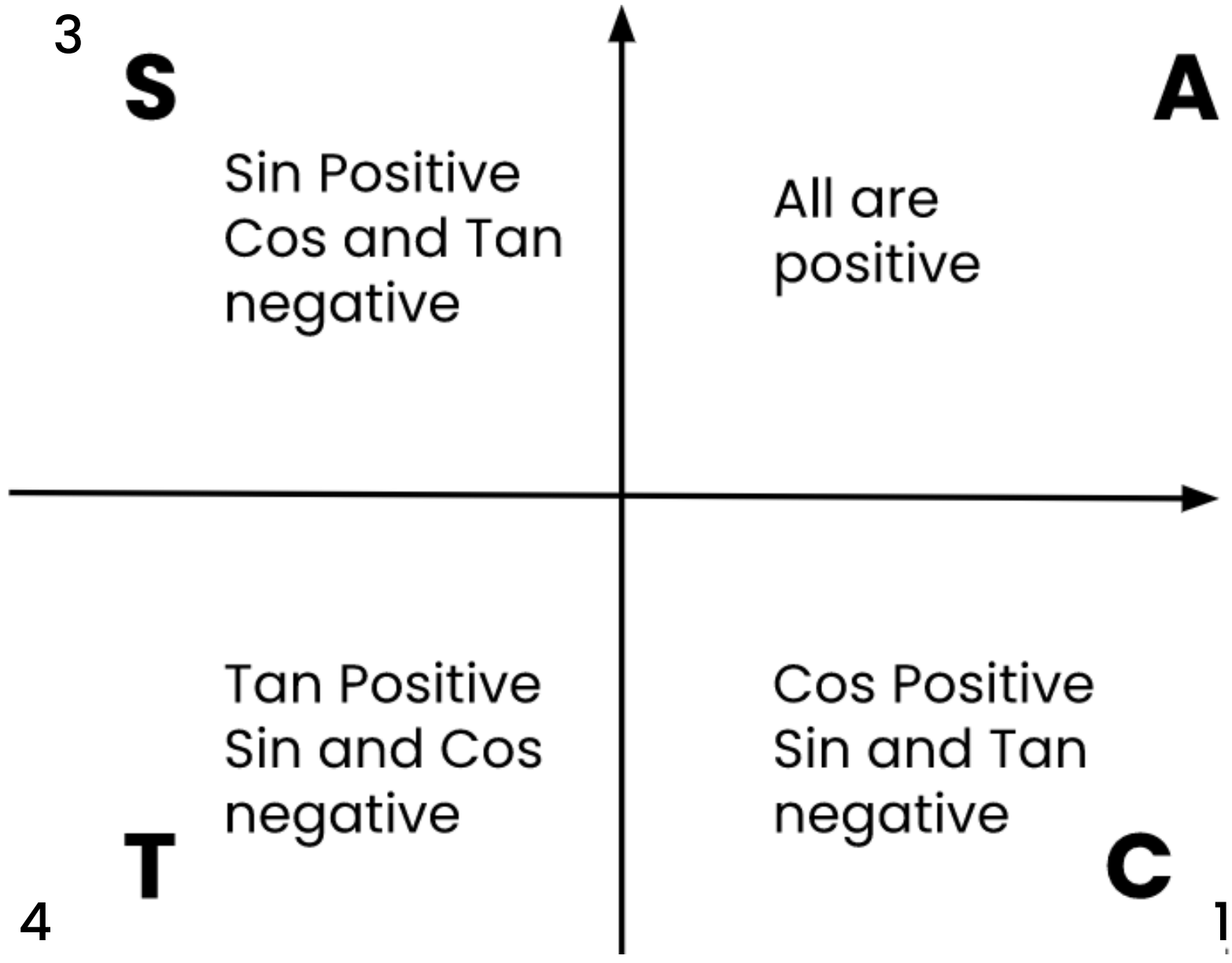
Trigonometry

Trigonometry Table

Angles (In Degrees)	0°	30°	45°	60°	90°	180°	270°	360°
Angles (In Radians)	**0**	**π/6**	**π/4**	**π/3**	**π/2**	**π**	**3π/2**	**2π**
sin	0	1/2	1/√2	√3/2	1	0	-1	0
cos	1	√3/2	1/√2	1/2	0	-1	0	1
tan	0	1/√3	1	√3	∞	0	∞	0
cot	∞	√3	1	1/√3	0	∞	0	∞
cosec	∞	2	√2	2/√3	1	∞	-1	∞
sec	1	2/√3	√2	2	∞	-1	∞	1

Trigonometry

CAST Rule



Probablity

Probability of occurrence = $\frac{\text{Number of occurrence}}{\text{Total number of events}}$

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

(for non mutually exclusive)

$$P(A \cup B) = P(A) + P(B)$$

(for mutually exclusive)