AKSHAYA TUTORIALS

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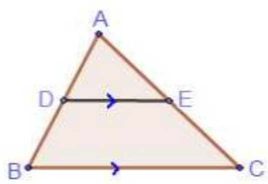
SSLC MATHEMATICS FORMULAE

ARTHEMATIC PROGRESSION

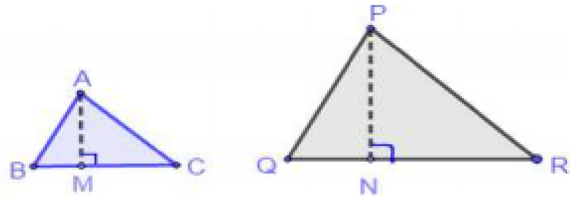
1. General form of A P
   $a, a+d, a+2d, a+3d......$
2. Formula to find the common difference
   $d=\frac{a_p-a_q}{p-q}$, $d=a_2-a_1, d=a_3-a_2$
3. n[th] term of an A P is $a_n=a+(n-1)d$
4. Sum of the terms of A P $S_n=\frac{n}{2}(2a+(n-1)d)$
5. Sum of the A P when a-first term and l-last term is given $S_n=\frac{n}{2}(a+l)$
6. Sum of first n natural numbers is given by
   $S_n=\frac{n(n+1)}{2}$
7. Sum of first even numbers
   $2+4+6+.......+2n=n(n+1)$
8. Sum of first odd numbers
   $1+3+5+......+(2n-1)=n^2$
9. Sum of first square terms
   $1^2+2^2+3^2+........+n^2=\frac{n(n+1)(2n+1)}{6}$
10. Sum of first cube terms
    $1^3+2^3+3^3+.......n^3=\left[\frac{n(n+1)}{2}\right]^2$
11. If a, b, c are in AP then Arthematic mean is given by
    $b=\frac{a+c}{2}$,where b is the A M of a and c

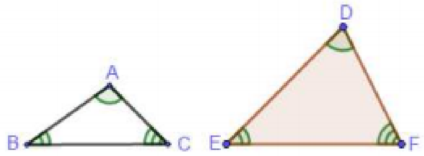
TRIANGLES

1. Thales theorem $\frac{AD}{DB}=\frac{AE}{EC}$



2. AAA postulate: if
   $\hat{A}=\hat{D}, \hat{B}=\hat{E}$ and $\hat{C}=\hat{F}$ then

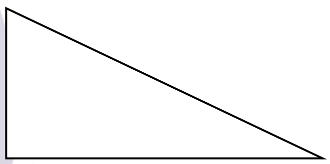




$\frac{AB}{DE}=\frac{BC}{EF}=\frac{CA}{FD}$

3. $\frac{\Delta(ABC)}{\Delta(PQTR)}=\left(\frac{AB}{PQ}\right)^2=\left(\frac{BC}{QR}\right)^2=\left(\frac{AC}{PR}\right)^2$

4. Pythagoras theorem: In a right angles trianglethe square on the hypotenous is equal to sum of the squares of other two sides



$AC^2=AB^2+BC^2$

PAIR OF LINEAR EQUATIONS IN TWO VARIABLES

1. General form of pair of linear equations
   $a_1x+b_1y+c_1=0$
   $a_2x+b_2y+c_2=0$
   If there are two linear equations then condition of them will be given as follows

Condition	Types of solution	Graphical representation	Types of system
$\frac{a_1}{a_2}\neq\frac{b_1}{b_2}$	Unique solution	Intersecting lines	consistent
$\frac{a_1}{a_2}=\frac{b_1}{b_2}=\frac{c_1}{c_2}$	Infinitely many solution	Coinciding lines	consistent
$\frac{a_1}{a_2}=\frac{b_1}{b_2}\neq\frac{c_1}{c_2}$	No solution	Parallel lines	inconsistent

CIRCLES

1. The line which touches the circle at only one point is called as tangent

2. The tangents drawn from external point to a circle are equal.

AREA RELATED TO CIRCLES

1. Circumference $2\pi r$
2. Are of a circle πr^2
3. The length of the arc which makes an angle θ at the centre is = $\frac{\theta}{360^0} \times 2\pi r$
4. The area of the sector which makes an angle θ at the centre is = $\frac{\theta}{360^0} \times \pi r^2$

CONSTRUCTION

The line drawn from the centre of the circle to the tangent is right angled triangle.

CO - ORDINATE GEOMETRY

1. The distance between the two points is defined by $AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
2. Distance of a point from the origin is given by $OA = \sqrt{x^2 + y^2}$
3. To prove that three points are collinear just prove that AC= AB+BC
4. Section formula for internal division is defined by $(x, y) = \left(\frac{mx_2 + nx_1}{m+n}, \frac{my_2 + ny_1}{m+n} \right)$
5. Section formula for external division is defined by $(x, y) = \left(\frac{mx_2 - nx_1}{m-n}, \frac{my_2 - ny_1}{m-n} \right)$
6. The mid point formula is $(x, y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$
7. Area of the triangle formed by the three points $(x_1, y_1), (x_2, y_2)$ *and* (x_3, y_3) is given by

$$\Delta = \frac{1}{2} \sum x_1 (y_2 - y_3)$$

$$\Delta = \frac{1}{2} [x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)]$$

REAL NUMBERS

1. Euclidean algorithm is defines by if a divides b then there exists unique q and r such that $b = aq + r$
2. Any composite number can be expressed as $n = p^{\alpha_1} \times p^{\alpha_2} \times$.........
3. $LCM \times HCF = a \times b$
4. HCF and GCD are same

POLYNOMIALS

1. Highest power of the variable is called as degree

Degree	name	General form
0	Constant	a
1	linear	$ax + b = 0$
2	quadratic	$ax^2 + bx + c = 0$
3	cubic	$ax^3 + bx^2 + cx + d = 0$

2. Polynomials division algorithm

$p(x) = g(x)q(x) + r(x)$

QUADRATIC EQUATIONS

Methods for solving quadratic equations

1.Factorization

2.Formula

3.Graphical

Formula to solve quadratic equation

$$x = \frac{-b + \sqrt{b^2 - 4ac}}{2a}$$

Nature of roots

$\Delta = b^2 - 4ac$	Nature of roots
$\Delta > 0$	Roots are real and unequal
$\Delta < 0$	Roots are imaginary
$\Delta = 0$	Roots are real and equal

1. If α and β are the roots (zeros) of the polynomial then

$\alpha + \beta = -\frac{b}{a}$ and $\alpha\beta = \frac{c}{a}$

2. If α, β and γ are the roots of the polynomial $ax^3 + bx^2 + cx + d = 0$ then

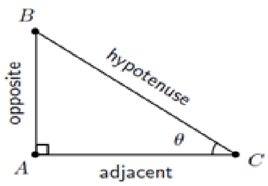
$$\alpha + \beta + \gamma = -\frac{b}{a}$$

$$\alpha\beta + \beta\gamma + \gamma\alpha = \frac{c}{a}$$

$$\alpha\beta\gamma = -\frac{d}{a}$$

TRIGONOMETRY

Opposite side – which is opposite to θ
Hypogenous- which is opposite to right angle
Adjacent – which is having both θ and side by side



T – function	t- ratio	
$\sin\theta$	$\frac{opp}{hyp}$	$\frac{AB}{BC}$
$\cos\theta$	$\frac{adj}{hyp}$	$\frac{AC}{BC}$
$\tan\theta$	$\frac{opp}{adj}$	$\frac{AB}{AC}$
$\operatorname{cosec}\theta$	$\frac{hyp}{opp}$	$\frac{BC}{AB}$
$\sec\theta$	$\frac{hyp}{adj}$	$\frac{BC}{AC}$
$\cot\theta$	$\frac{adj}{opp}$	$\frac{AC}{AB}$

Trigonometric reciprocal function

$\sin\theta.\operatorname{cosec}\theta = 1$	$\sin\theta = \frac{1}{\operatorname{cosec}\theta}$	$\operatorname{cosec}\theta = \frac{1}{\sin\theta}$
$\cos\theta.\sec\theta = 1$	$\cos\theta = \frac{1}{\sec\theta}$	$\sec\theta = \frac{1}{\cos\theta}$
$\tan\theta.\cot\theta = 1$	$\tan\theta = \frac{1}{\cot\theta}$	$\cot\theta = \frac{1}{\tan\theta}$

Trigonometric quotient relation

$\tan\theta = \frac{\sin\theta}{\cos\theta}$	$\cot\theta = \frac{\cos\theta}{\sin\theta}$

Trigonometric identities

$\sin^2\theta + \cos^2\theta = 1$
$1 + \tan^2\theta = \sec^2\theta$
$1 + \cot^2\theta = \operatorname{cosec}^2\theta$

Trigonometric standard angles

	0^0	30^0	45^0	60^0	90^0
$\sin\theta$	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
$\cos\theta$	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
$\tan\theta$	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	ND
$\operatorname{cosec}\theta$	ND	2	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	1
$\sec\theta$	1	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	ND
$\cot\theta$	ND	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	0

Trigonometric complimentary angles

$\sin(90-\theta) = \cos\theta$	$\operatorname{cosec}(90-\theta) = \sec\theta$
$\cos(90-\theta) = \sin\theta$	$\sec(90-\theta) = \operatorname{cosec}\theta$
$\tan(90-\theta) = \cot\theta$	$\cot(90-\theta) = \tan\theta$

STATISTICS

The mean for grouped data can be found by

Method	formula
Direct method	$\bar{x} = \frac{\sum f_i x_i}{\sum f_i}$
Assumed mean method	$\bar{x} = a + \frac{\sum f_i d_i}{\sum f_i}$
Step deviation method	$\bar{x} = a + \frac{\sum f_i u_i}{\sum f_i} \times h$
The mode of grouped data can be found by	$l + \left[\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right] \times h$
The median for grouped data can be found by using the	$l + \left[\frac{\frac{n}{2} - cf}{f}\right] \times h$

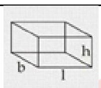
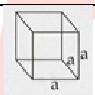
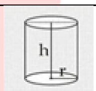
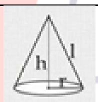
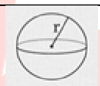
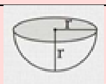
PROBABILITY

1. All possible outcome set is called as sample space
2. Any possible outcomes are called as event denoted by E
3. Probability always lies between 0 and 1
4. Probability of sure event is 1
5. Probability of impossible event is 0
6. Probability is defined as

$$p(A) = \frac{no\ of\ \ favourable\ outcomes}{total\ no\ outcomes} = \frac{p(E)}{p(S)}$$

7. For any event $p(E) + p(\overline{E}) = 1$,where E is the event and $\overline{E}$ is not E

SURFACE AREA AND VOLUME

NAME OF THE SOLID	FIGURE	VOLUME	CURVED SURFACE AREA	TOTAL SURFACE AREA
CUBOID		lbh	$2h(l+b)$	$2(lh + bh + hb)$
CUBE		a^3	$4a^3$	$6a^2$
RIGHT CIRCULAR CYLINDER		$\pi r^2 h$	$2\pi rh$	$2\pi r(h + r)$
RIGHT CIRCULAR CONE		$\frac{1}{3}\pi r^2 h$	πrl	$\pi r(l + r)$
SPHERE		$\frac{4}{3}\pi r^3$	$4\pi r^2$	$4\pi r^2$
HEMISPHERE		$\frac{2}{3}\pi r^3$	$2\pi r^2$	$3\pi r^2$