Complete Formula Sheet for Term 2 Maths

Welcome to Byjus
Grade 10
Term 2
Formula Sheet

Grade 10
Term 2

Formula Sheet

Chapters to be covered

CP – 01

QUADRATIC EQUATIONS

CP - 02

ARITHMETIC PROGRESSIONS

CP - 03

CIRCLES

CP – 04

CONSTRUCTIONS

CP – 05

SOME APPLICATIONS OF TRIGONOMETRY

CP - 06

SURFACE AREAS AND VOLUMES

CP - 07

STATISTICS

BYJU'S 8-10

Chapters to be covered

CP – 01

QUADRATIC EQUATIONS

BYJU'S 8-10

Quadratic Equation

1. Standard Form of Quadratic Equations
2. Zeros, Roots and Solutions
3. Methods to Solve
4. Nature of Roots

Important Terms

Degree

$ax^2 + bx + c = 0$

a, b, and c are real numbers and $a \neq 0$

Zeros

Zeros of quadratic **polynomial** P(x)

$P(x) = (x-2)(x-2)$

$x = 2 \& 2$

Roots

Roots of quadratic **equation**

$(x-2)(x-2) = 0$

$x = 2 \& 2$

Solution

The values of the **unknown variable x,** which satisfy the equation..

$(x-2)(x-2)=0$

$x = 2$

Methods to Solve Quadratic Equations

- Factorization
- Quadratic Formula

Factorization

1. Split the middle term.

   Product of split terms
   $= (a \times c)$

2. Factorize the equation

3. Equate each factor to 0

General form:
$ax^2 + bx + c = 0.$

Eg: $9x^2 - 3x - 2 = 0.$

$9x^2 - 6x + 3x - 2 = 0.$

$3x(3x - 2) + 1(3x - 2) = 0.$

$(3x - 2)(3x + 1) = 0$

$x = \frac{2}{3}$ or $x = -\frac{1}{3}.$

Quadratic Formula

$$ax^2 + bx + c = 0$$

$$\text{Root } x = \frac{(-b \pm \sqrt{b^2 - 4ac})}{2a}$$

i.e.,

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

where , $b^2 - 4ac \geq 0$

The quadratic formula is used where the factorization method is difficult to apply.

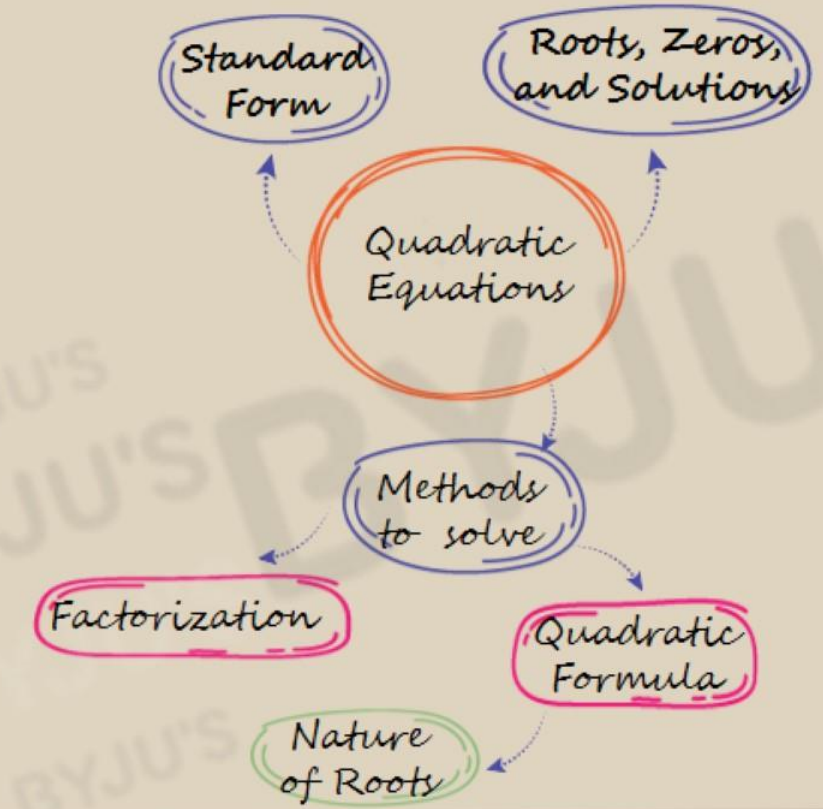
Nature Of Roots

$$ax^2 + bx + c = 0$$

Discriminant $(D) = b^2 - 4ac$

Nature of Roots

	$b^2 - 4ac > 0$	$b^2 - 4ac = 0$	$b^2 - 4ac < 0$
Type of Roots	Real & Distinct Roots	Real & Equal Roots	No Real Roots
Value of Roots	$= \frac{-b \pm \sqrt{D}}{2a}$	$= \frac{-b}{2a}, \frac{-b}{2a}$	Not Valid



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CP – 01

QUADRATIC EQUATIONS

CP - 02

ARITHMETIC PROGRESSIONS

Arithmetic progression

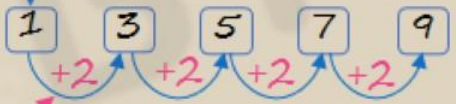
1. Arithmetic progression
2. General form of an AP
3. n^{th} Term of an AP
4. Sum of first n terms of an AP

Arithmetic progression

An arithmetic progression is a sequence of numbers in which each term is obtained by adding a fixed number to the preceding term, except the first term.

Example

1st Term (First number in the AP, a)



Common difference

(The difference between consecutive terms in an AP is a fixed number, d)

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General Form of an AP

A sequence of the form

$$a,\ a+d,\ a+2d,\ a+3d,\ a+4d \text{ and so on,}$$

Where a is the first term and d is a common difference.

n^{th} Term of an AP

$$a_n = \{a + (n-1)d\}$$

where a_n is the n^{th} term,

a is the first term,

d is the common difference and

n is the number of terms in the sequence.

Sum of First n Terms in an AP

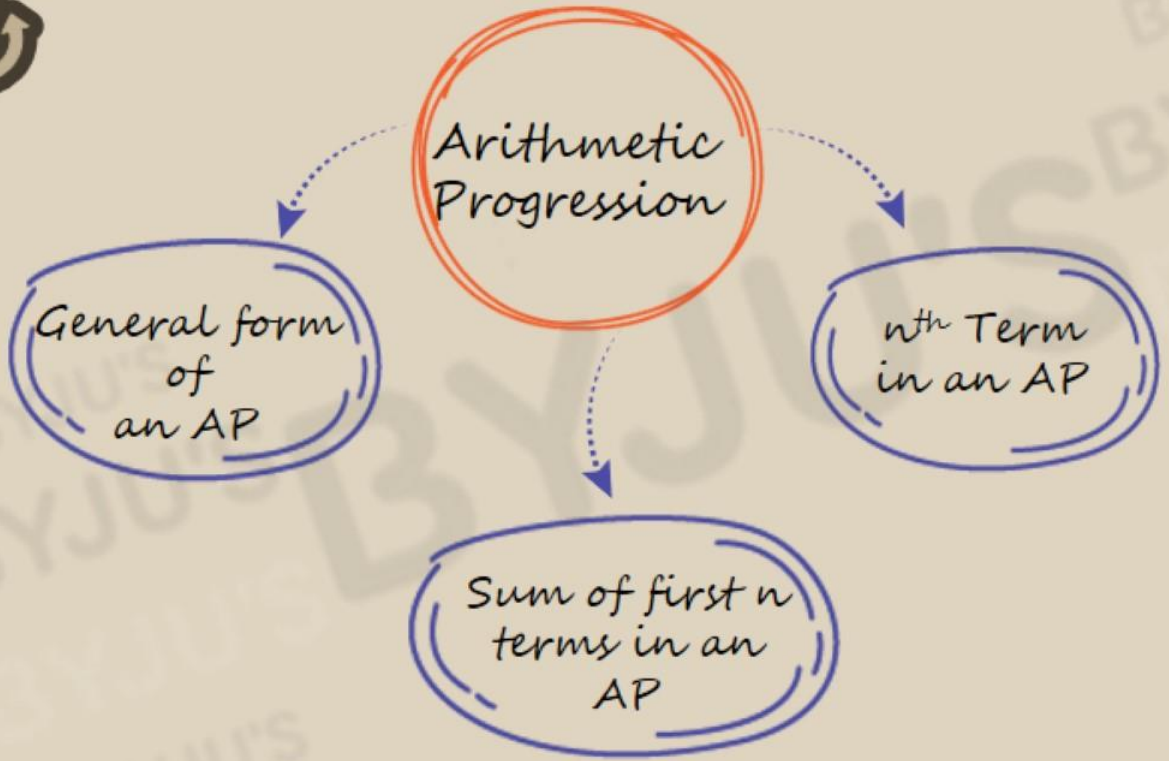
$$S_n = \frac{n}{2}\{2a + (n-1)d\}$$

When first term (a) and common difference (d) are known

$$S_n = \frac{n}{2}(a + l)$$

When first term (a) and last term (l) are known

where n is the number of terms in the sequence and S_n is the sum of first n terms


Arithmetic Progression
General form of an AP
nth Term in an AP
Sum of first n terms in an AP

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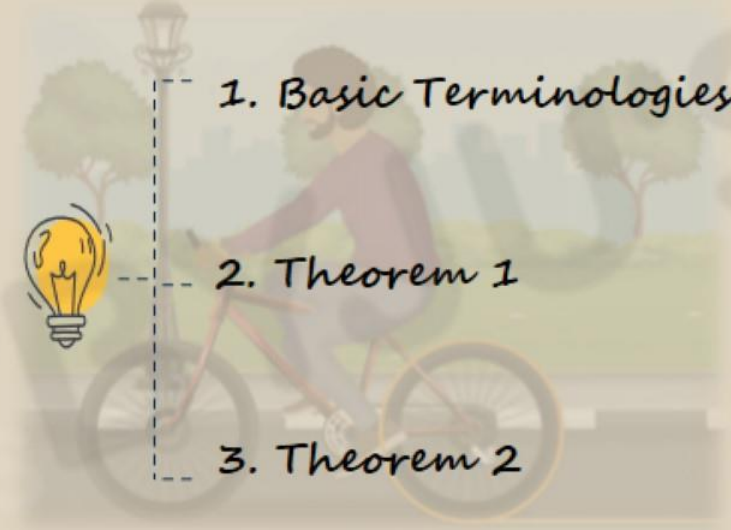
CIRCLES

BYJU'S 8-10

Circle



1. Basic Terminologies
2. Theorem 1
3. Theorem 2

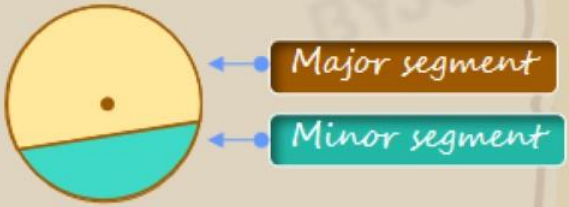
Basic Terminologies

Sector

The region between an arc and the two radii

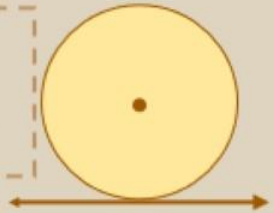
Segment

The region between a chord and the arc



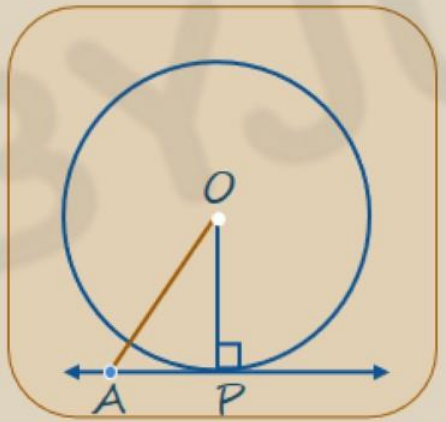
Tangent

Line touching the circle at only one point



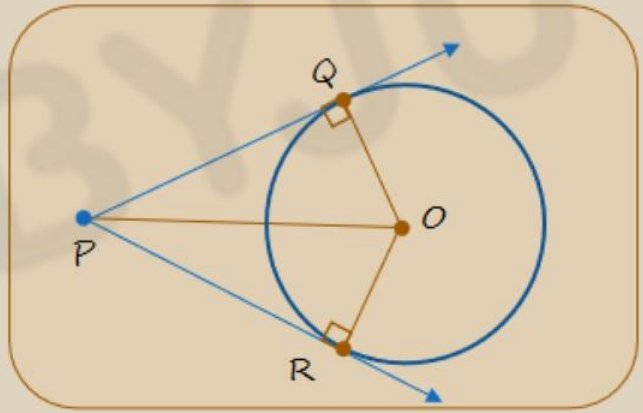
Theorem 1

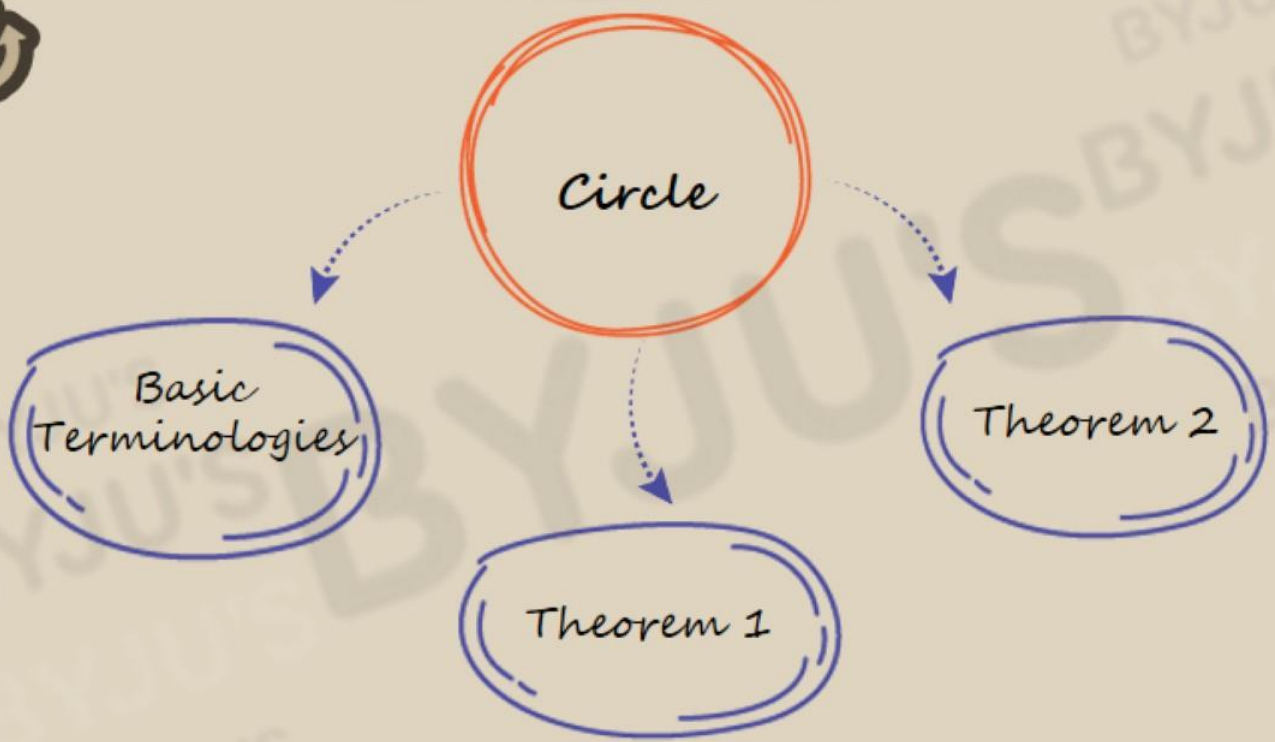
The tangent at any point of a circle is perpendicular to the radius through the point of contact.



Theorem 2

The lengths of tangents drawn from an external point to a circle are equal.




Circle
Basic Terminologies
Theorem 1
Theorem 2

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CONSTRUCTIONS

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Construction

1. Division of a line segment in a given ratio
2. Construction of pair of tangents

Division of a line segment in the given ratio

Example

Let's divide a line segment of length 16 cm in the ratio 5:3.

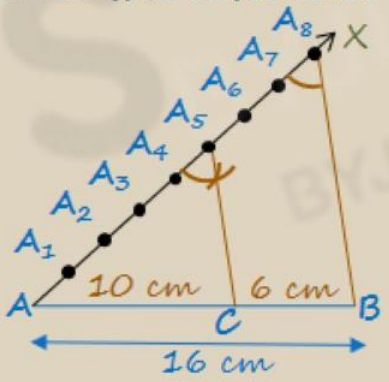
Step 1: Draw AB = 16 cm

Step 2: Draw a ray AX making an acute angle with AB.

Step 3: Locate 8 (= 5 + 3) points on ray AX such that,
$AA_1 = A_1A_2 = A_2A_3 = A_3A_4 = \ldots = A_7A_8$

Step 4: Join BA_8

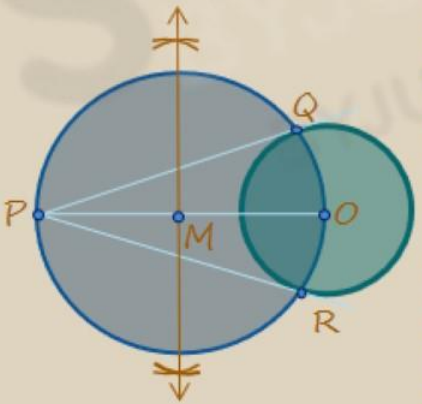
Step 5: Draw a line parallel to BA_8 from point A_5 (by making an angle equal to $\angle AA_8B$) intersecting AB at point C.



Construction of Pair of Tangents

Example

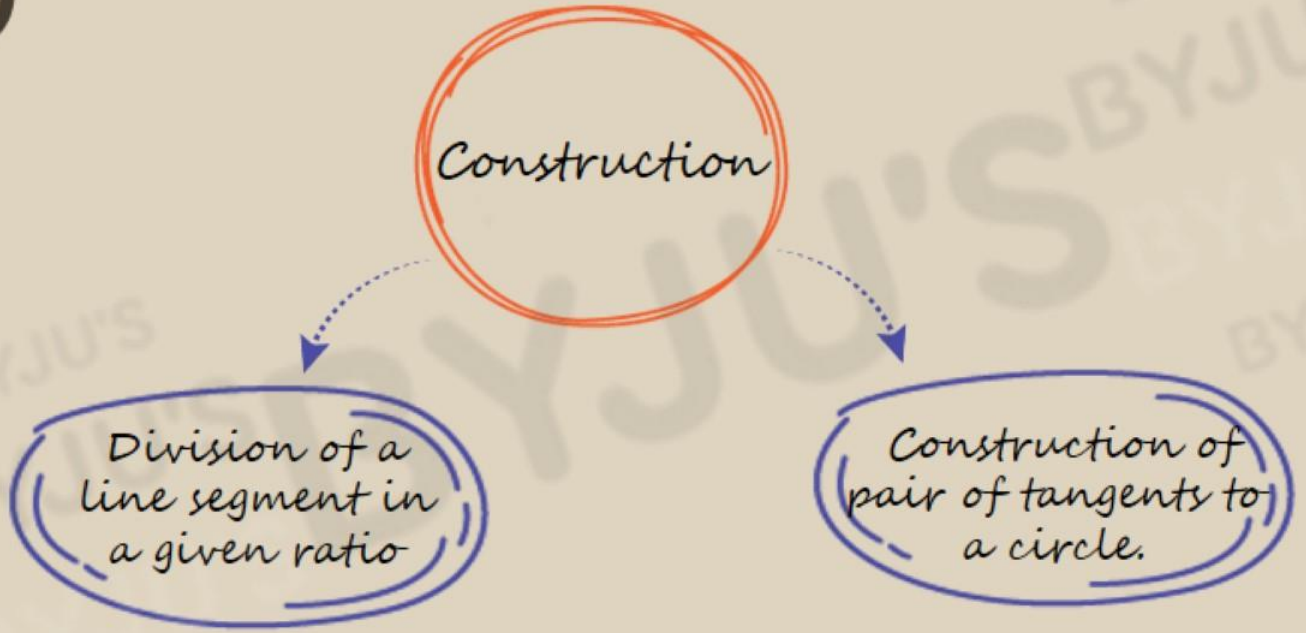
To construct the tangents to a circle from a point P outside it.



Step 1: Join PO and draw a perpendicular bisector of PO to locate its midpoint. Let's say M is the midpoint of PO.

Step 2: Taking M as a centre and MO (or MP) as radius, draw a circle. Let it intersect the given circle at the points Q and R.

Step 3: Join PQ and PR.


Construction
Division of a line segment in a given ratio
Construction of pair of tangents to a circle.

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SOME APPLICATIONS OF TRIGONOMETRY

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Some Applications of Trigonometry

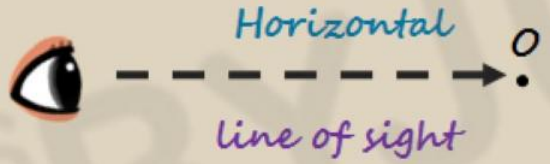
1. Basic Terminologies

2. Assumptions made while solving

3. Trigonometric Ratios of Some Common Angles

Basic Terminologies

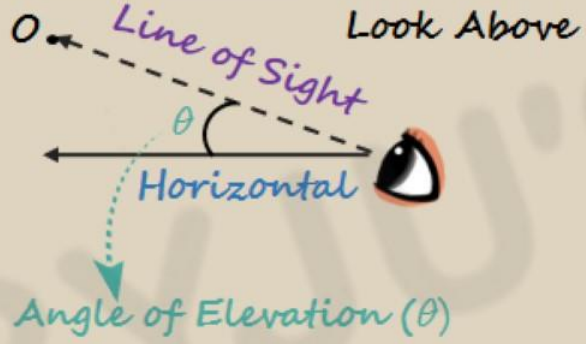
If the object to be viewed is straight ahead, then the line of sight is the same as the horizontal level.



Line of Sight

The line drawn from the eyes of an observer to a point on the object viewed.

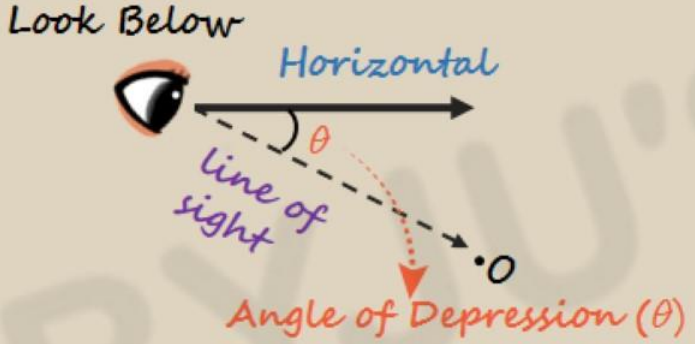
Basic Terminologies



Angle of Elevation

The angle formed by the line of sight with the horizontal when the point being viewed is above the horizontal level.

Basic Terminologies



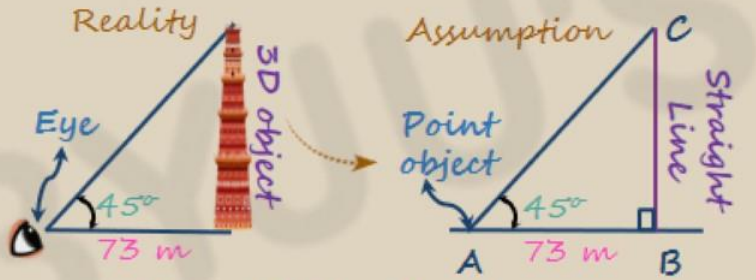
Angle of Depression

The angle formed by the line of sight with the horizontal when the point being viewed is below the horizontal level.

Assumptions made while solving

Example

The angle of elevation of the top of the Qutub Minar, 73 m away from its base is 45°.



Steps to Draw the figure:

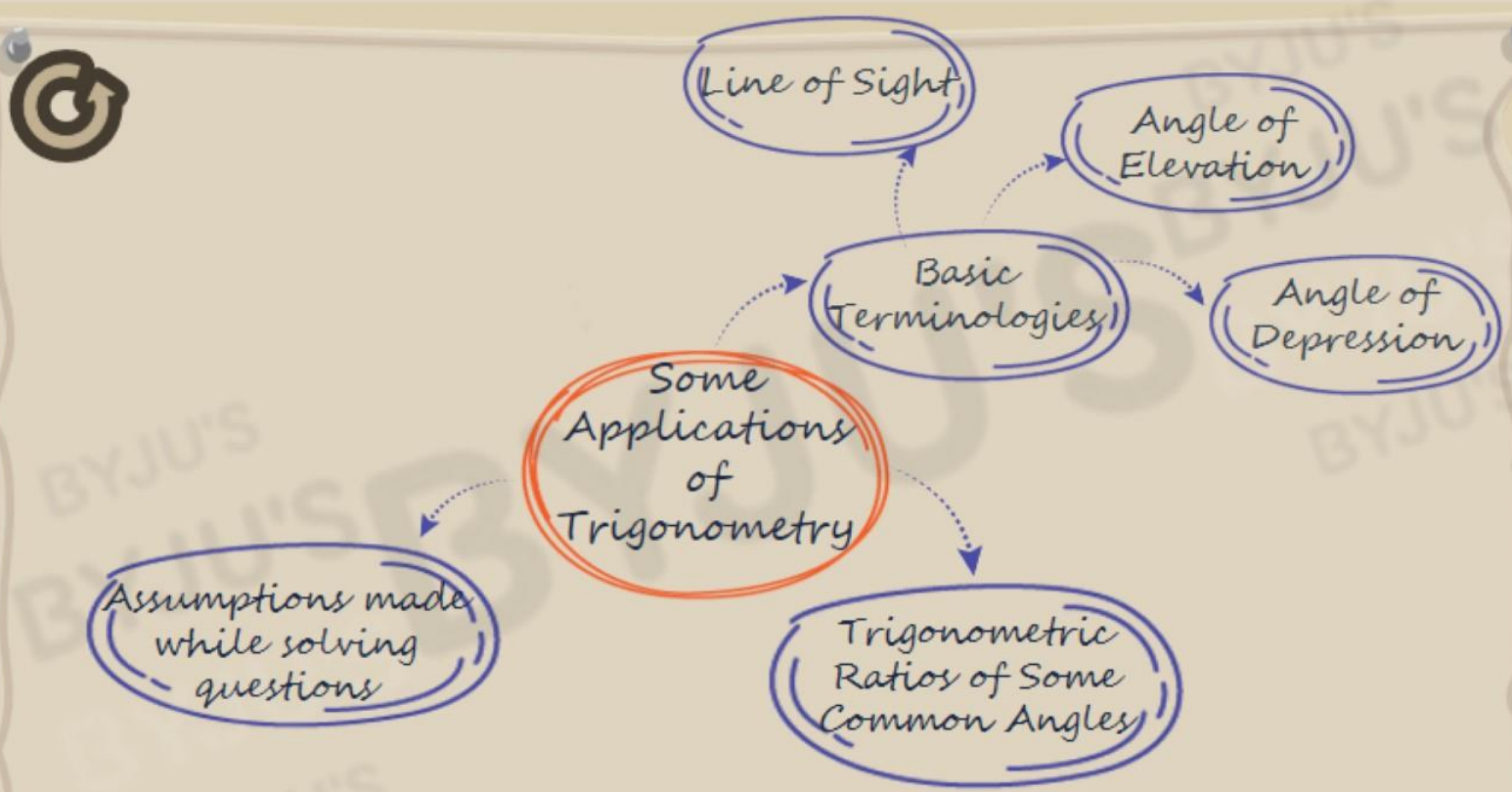
1, Represent the 3D object by a vertical line.

2. Represent the observer as a point object.

3. Label the angle, height and distance

Trigonometric Ratios of Some Common Angles

Ratio \ Angle θ	0°	30°	45°	60°	90°
sin θ	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
cos θ	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
tan θ	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	Not defined
cosec θ	Not defined	2	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	1
sec θ	1	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	Not defined
cot θ	Not defined	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	0


Line of Sight
Angle of Elevation
Basic Terminologies
Angle of Depression
Some Applications of Trigonometry
Assumptions made while solving questions
Trigonometric Ratios of Some Common Angles

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SURFACE AREAS AND VOLUMES

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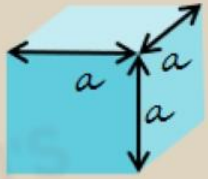
Surface Areas and Volumes

1. Formulae of Solids
2. Combination of Solids
3. Surface Area of Combined Solids
4. Volume of Combined Solids
5. Conversion of Solids

Formulae of Solids

Cube



$4a^2$: Lateral surface area

$6a^2$: Total surface area

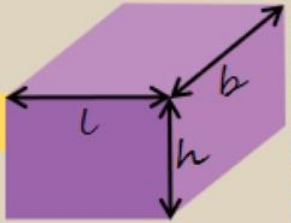
a^3 : Volume

Cuboid

Lateral surface area : $2h(l + b)$

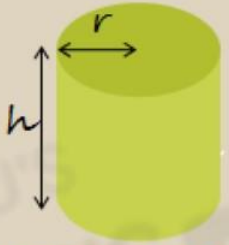
Total surface area : $2(lb + bh + hl)$

Volume : lbh



Formulae of Solids

Cylinder



$2\pi rh$: Curved surface area

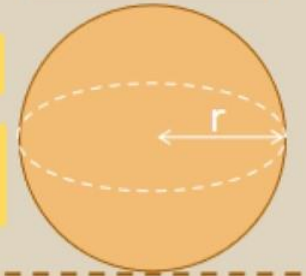
$2\pi rh + 2\pi r^2$: Total surface area

$\pi r^2 h$: Volume

Sphere

Curved surface area : $4\pi r^2$

Volume : $\frac{4}{3}\pi r^3$



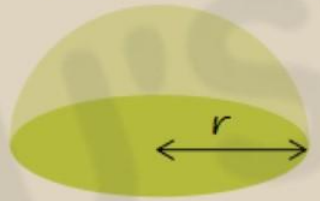
Formulae of Solids

Hemisphere

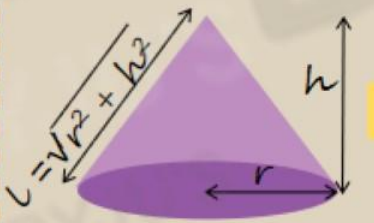
Curved surface area : $2\pi r^2$

Total surface area : $3\pi r^2$

Volume : $\frac{2}{3}\pi r^3$



Cone



πrl : Curved surface area

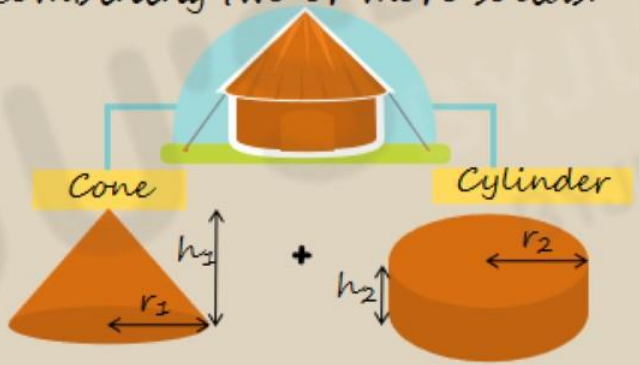
$\pi rl + \pi r^2$: Total surface area

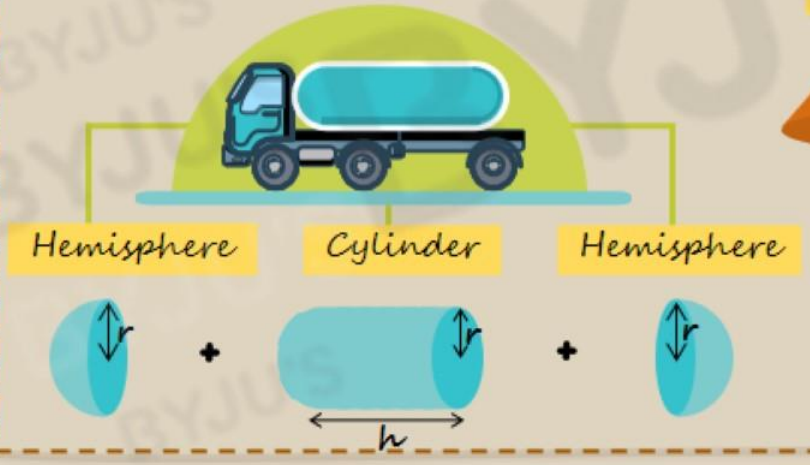
$\frac{1}{3}\pi r^2 h$: Volume

Combination of solids

Example

Shapes that are formed by combining two or more solids.

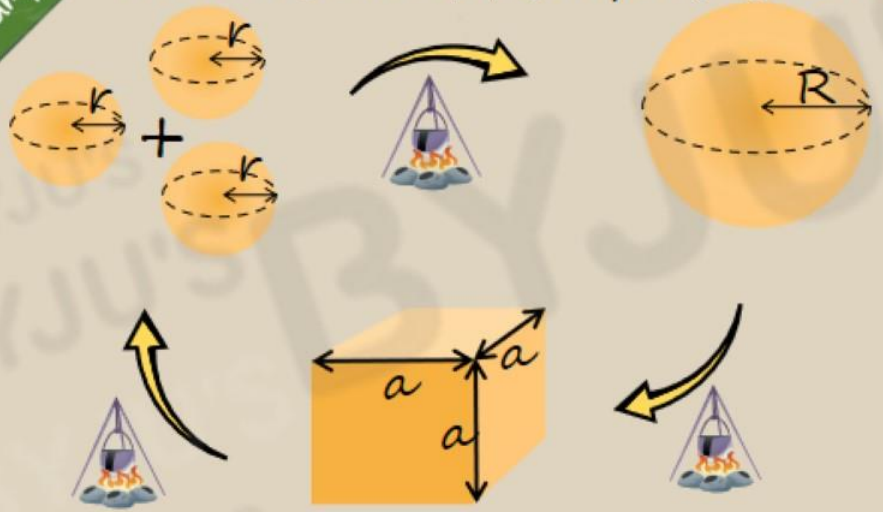




Conversion of solids

Example

When a solid is reshaped, its volume remains the same.



Sum of volumes of smaller spheres = Volume of the larger sphere = Volume of the cube

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CP - 07

STATISTICS

Statistics

1. Mean of Grouped Data
2. Median of Grouped Data
3. Mode of Grouped Data

Mean of Grouped Data

Mean is a measure of central tendency which gives the average of data.

Mean

Direct Method

$$\bar{x} = \frac{\Sigma f_i x_i}{\Sigma f_i}$$

$$\text{Class mark } (x_i) = \frac{\text{Upper + Lower Class Limit}}{2}$$

Assumed Mean Method

An arbitrary mean 'a' is chosen which is called 'assumed mean', somewhere in the middle of all the values of x.

$$\bar{x} = a + \frac{\Sigma f_i d_i}{\Sigma f_i} \quad \text{Where } d_i = (x_i - a)$$

Median of Grouped Data

The median of a set of data is the middlemost number or center value in the set.

$$\text{Median} = l + \left(\frac{\frac{n}{2} - cf}{f}\right) \times h$$

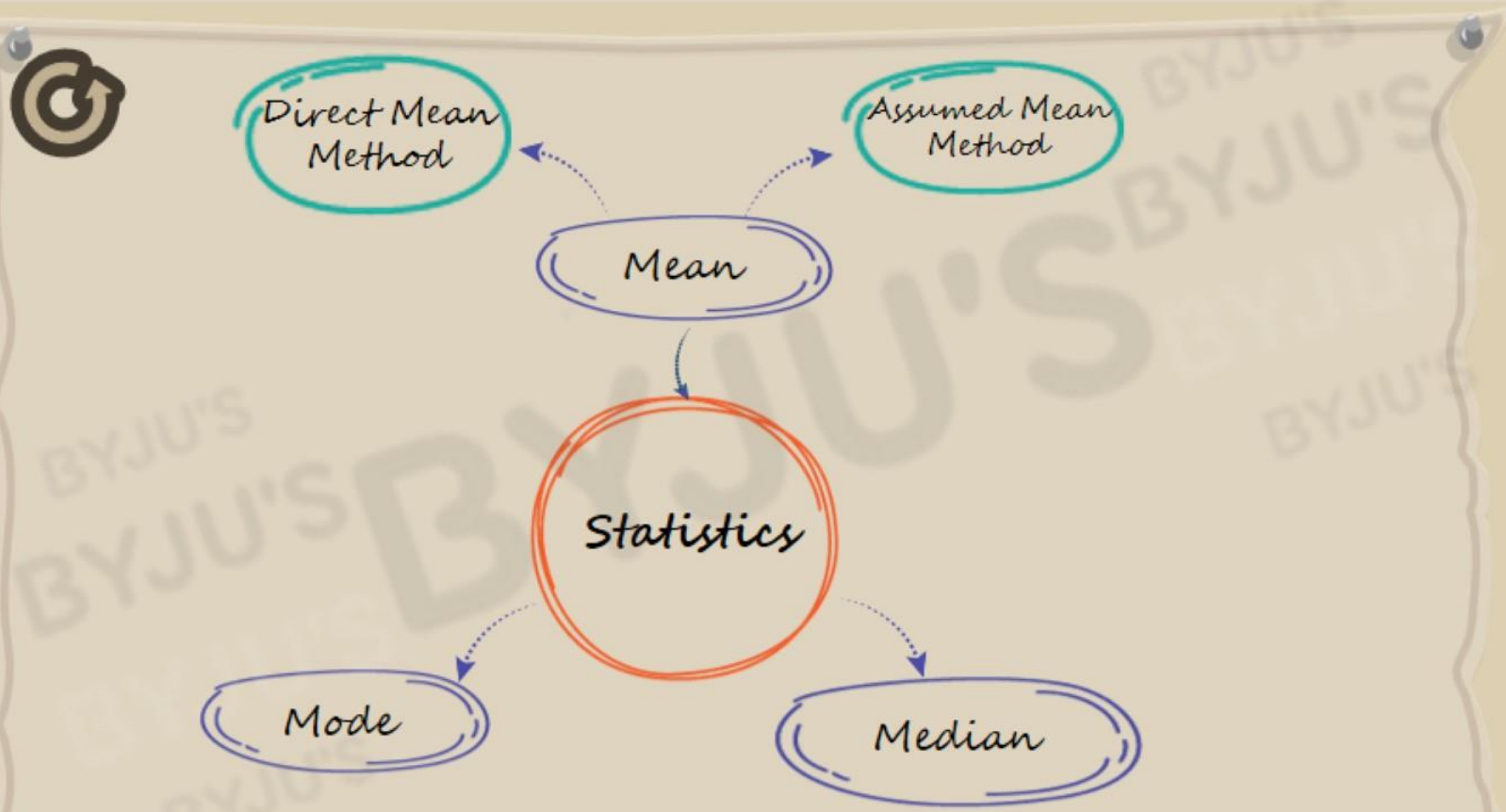
l = Lower limit of median class
n = Number of observations
f = Frequency of median class
cf = Cumulative frequency of preceding class
h = Class size

Mode of Grouped Data

The mode is the value that is repeatedly occurring in a given set.

$$\text{Mode} = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h$$

l = lower class limit of the modal class
h = class interval size
f_1 = frequency of the modal class
f_0 = frequency of the preceding class
f_2 = frequency of the succeeding class


Direct Mean Method
Assumed Mean Method
Mean
Statistics
Mode
Median

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