

Mathematics Study Notes

1. Algebra

Algebra is a branch of mathematics dealing with symbols and the rules for manipulating these symbols.

Basic Rules

1. Like terms can be added or subtracted.
2. Multiplication is distributive over addition.
3. Variables represent numbers.

Examples

Simplify: $2x + 3x = 5x$

Expand: $(x + 2)(x + 3) = x^2 + 5x + 6$

2. Trigonometry

Trigonometry deals with the relationship between the sides and angles of a triangle.

Important Ratios

$\sin \theta = \text{Opposite} / \text{Hypotenuse}$

$\cos \theta = \text{Adjacent} / \text{Hypotenuse}$

$\tan \theta = \text{Opposite} / \text{Adjacent}$

Identities

$\sin^2 \theta + \cos^2 \theta = 1$

$\tan^2 \theta + 1 = \sec^2 \theta$

$1 + \cot^2 \theta = \csc^2 \theta$

Example Problem

If $\sin \theta = 3/5$, find $\cos \theta$ and $\tan \theta$.

Solution: $\cos \theta = 4/5$, $\tan \theta = 3/4$.

3. Geometry

Geometry deals with shapes, sizes, and properties of figures.

Important Theorems

1. Pythagoras Theorem: In a right triangle, $\text{Hypotenuse}^2 = \text{Base}^2 + \text{Perpendicular}^2$.
2. Sum of angles of a triangle = 180° .

Example

In a triangle, if two angles are 50° and 60° , find the third angle.

Solution: $180^\circ - (50^\circ + 60^\circ) = 70^\circ$.

4. Mensuration

Mensuration is the branch of mathematics that deals with measurement of length, area, and volume.

Formulas

Area of Rectangle = $l \times b$

Area of Triangle = $\frac{1}{2} \times \text{base} \times \text{height}$

Volume of Cube = a^3

Volume of Cylinder = $\pi r^2 h$

5. Statistics

Statistics deals with collection, organization, and interpretation of data.

Measures of Central Tendency

Mean = Sum of observations / Number of observations

Median = Middle value

Mode = Most frequent value

Example

Find the mean of: 2, 4, 6, 8, 10.

Solution: $(2+4+6+8+10)/5 = 30/5 = 6$.

6. Probability

Probability is the measure of the likelihood of an event occurring.

Formula

Probability (P) = Favourable Outcomes / Total Outcomes

Example

What is the probability of getting a 3 on a dice?

Solution: $1/6$.

Exercises

1. Simplify: $(x+2)(x+5)$
2. Find $\tan \theta$ if $\sin \theta = 12/13$.
3. In a triangle, angles are 40° and 80° . Find the third angle.

4. Find the volume of a sphere of radius 7 cm.
5. The marks of 10 students are: 5, 7, 8, 6, 9, 7, 10, 8, 6, 7. Find the mean.
6. A coin is tossed once. What is the probability of getting heads?

Teacher Sheila Resposito