CLASS 6 (Maths)
REVISION NOTES

Mensuration

- Mensuration is the branch of mathematics that deals with the measurement of length, area or volume of various geometric shapes.

Shapes

- A shape is the form of an object.
- Examples of two-dimensional shapes are square, rectangle and triangle, and of three-dimensional shapes are cube, cuboid and sphere.

Perimeter

- Perimeter is the total length or total distance covered along the boundary of a closed shape.
- Perimeter of a circle is also called as the circumference of the circle.

Perimeter of a Triangle

- Perimeter of triangle = Sum of lengths of all sides = a + b + c.
- If the given triangle is equilateral that is if all the sides are equal (a = b = c), then its perimeter is equal to 3 × length of one side of the triangle.

Perimeter of a Rectangle

- Perimeter of the rectangle = length (l) + length (l) + width (w) + width (w)
  = 2× [length (l) + width (w)]

Perimeter of a Square

Perimeter of square = 4 × length of a side = 4a

Perimeter of a 'n' sided polygon

- A polygon is a closed shape made up of line segments.
- Perimeter of n sided polygon = n× length of one side.

Perimeter of irregular shapes

- Irregular shapes are the shapes which do not have all sides and angles equal.
- The perimeter of irregular shapes is equal to total length covered by the shape. In the figure given below, perimeter is the sum of all sides.

Area

- Area is the total amount of surface enclosed by a closed figure.

Area of Square

- Area of a square = Side × Side =Side^2=a^2, where a is the length of each side.

Area of Rectangle

- Area = length (l) × breadth (b)

Area of a triangle

Area of triangle = (1/2) × base × height = (1/2) × b × h

Introduction to Algebra

Algebra is a part of mathematics in which the letter and symbols are used to represent numbers in equations. It helps us to study about unknown quantities.

Matchstick Patterns
No. of matchsticks used to make 1st square = 4
No. of matchsticks used to make 2nd square = 7
No. of matchsticks used to make 3rd square = 10

So, the pattern that we observe here is 3n + 1

The Idea of a Variable

Variable refers to the unknown quantities that can change or vary and are represented using the lowercase letter of the English alphabets.

One such example of the same is the rule that we used in the matchstick pattern 3n + 1

Here the value of n is unknown and it can vary from time to time.

- We can use any letter as a variable, but only lowercase English alphabets.
- Numbers cannot be used for the variable as they have a fixed value.
- They can also help in solving some other problems.

Use of Variables in Common Rules (Geometry)

1. **Perimeter of Square**

The perimeter of a square = Sum of all sides

= 4 × side

= 4s Thus, p = 4s

Here s is variable, so the perimeter changes as the value of side change.

2. **Perimeter of Rectangle**

Perimeter of rectangle = 2(length + breadth)

= 2 (l + b) or 2l + 2b Thus, p + 2 × (l + b) or 2l + 2b

Where, l and b are variable and the value of perimeter changes with the change in l and b.

Use of Variables in Common Rules (Arithmetic)

1. **Commutativity of Addition**

This is the commutative property of addition of the numbers, in which the result remains the same even if we interchanged the numbers.

a + b = b + a Here, a and b are different variables.

2. **Commutativity of Multiplication**

This is the commutative property of multiplication, in which the result remains the same even if we interchange the numbers.

a × b = b × a Here, a and b are different variables.

3. **Distributivity of Numbers**

It is a complex sum but there is an easy way to solve it. It is known as the Distributivity of multiplication over the addition of numbers.

A × (b + c) = a × b + a × c Here, a, b and c are different variables.

4. **Associativity of Addition**

This property states that the result of the numbers added will remain same regardless of their grouping. (a + b) + c = a + (b + c)

Expressions

Arithmetic expressions may use numbers and all operations like addition, subtraction, multiplication and division

Expressions with variable

We can make expressions using variables like

2m, 5 + t etc…..

An expression containing variable/s cannot be analyzed until its value is given.

Equation

If we use the equal sign between two expressions, then they form an equation.

An equation satisfies only for a particular value of the variable.

The equal sign says that the LHS is equal to the RHS and the value of a variable which makes them equal is the only solution of that equation.

The Solution of an Equation

The value of the variable which satisfies the equation is the solution to that equation. To check whether the particular value is the solution or not, we have to check that the LHS must be equal to the RHS with that value of the variable.

Trial and Error Method

To find the solution of the equation, we use the trial and error method.

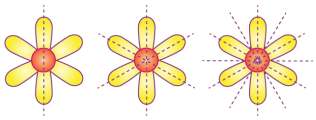
Introduction to Ratio and Proportion

Ratio

- The ratio is the comparison of a quantity with respect to another quantity.
- It is denoted by ":".
- Two quantities can be compared only if they are in the same unit.

Unitary Method

The method in which first we find the value of one unit and then the value of required number of units is known as Unitary Method.



Proportions

If two ratios are equal, then they are said to be in proportion.

- Symbol "::" or "=" is used to equate the two ratios.

Symmetry

The symmetry of an object is defined as one half of the object is a mirror image of the other half.

When an object is split into half, both the sides are exactly the same.

When figures have equally balanced proportions, they are said to be symmetrical.

Types

Bilateral symmetry

If a figure is divided into two halves by only one line and these halves overlap each other completely, then the figure is said to have bilateral symmetry.

Example: A butterfly shows bilateral symmetry.

Line symmetry

A figure has line symmetry if a line can be drawn dividing the figure into two symmetrical parts. The line is called a line of symmetry.

Example: The dotted lines in the following figures show line symmetry.

Reflection Symmetry

Reflection symmetry is very similar to line symmetry except for the change in orientation.

For example, when you view yourself in the mirror, your right hand becomes the left hand in the mirror.

Point Symmetry

Point symmetry exists when a figure is drawn around a single central point.

It is for figures having a point through which the symmetry can be established.

This point is called the centre of symmetry

CLASS 7 (Maths)
Formula List

Classification of triangles based on sides and angles

Triangles can be classified based on their:

SIDES:

- Equilateral triangle: All three sides are equal in measure.
- Isosceles triangle: Two sides have equal measure.
- Scalene triangle: All three sides have different measures.

ANGLES:

- Acute triangle: All angles measure less than 90^0.
- Obtuse triangle: One angle is greater than 90^0.
- Right triangle: One angle is 90^0.

Formulas

Rectangle: Area = l × b
Perimeter = 2(l + b)

Square: Area = s^2
Perimeter = 4 × s

Triangle: Area = $\frac{1}{2}$ × b × h
Perimeter = Sum of all sides

Parallelogram: Area = b × h

Circle: Area = πr^2
Perimeter = $2\pi r$

Conversion of Units

1cm^2 = 100mm^2 1m^2 = 10000cm^2 1 hectare = 10000m^2

Laws of Exponents:

$(i)\ a^m \times a^n = a^{m+n}$ $(ii)\ \frac{a^m}{a^n} = a^{m-n}$

$(iii)\ (a^m)^n = a^{mn}$ $(iv)\ a^m \times b^m = (ab)^m$

$(v)\ \frac{a^m}{b^m} = \left(\frac{a}{b}\right)^m$ $(vi)\ a^0 = 1$

$(vii)\ \left(\frac{a^{-m}}{b^{-n}}\right) = \frac{b^n}{a^m}$ $(viii)\ \left(\frac{a}{b}\right)^{-m} = \left(\frac{b}{a}\right)^m$

- $a^n = 1 \Rightarrow n = 0$
- $1^n = 1$ where n is any integer.
- $(-1)^n = 1$ where n is any even integer.
- $(-1)^n = -1$ where n is any odd integer.

Class 8 (Maths)
Formula list

Algebraic Expression and identities

- $x + y)^2 = x^2 + 2xy + y^2$
- $(x - y)^2 = x^2 - 2xy + y^2$
- $(x + y)(x - y) = x^2 - y^2$
- $(x + a)(x + b) = x^2 + (a + b)x + ab$

Visualizing Solid Shapes Euler's formula: F + V = E + 2

Mensuration

- Rectangle: Area = l × b
  Perimeter = 2(l + b)
- Square: Area = s^2
  Perimeter = 4 × s
- Triangle: Area = $\frac{1}{2}$ × b × h
  Perimeter = Sum of all sides
- Parallelogram: Area = b × h
- Circle: Area = πr^2
  Perimeter = $2\pi r$
- Trapezium: Area = $\frac{1}{2}$ × h × (a + b)
- Quadrilateral: Area = $\frac{1}{2}$ × d × (h1 + h2)
- Rhombus: Area = $\frac{1}{2}$ × d1 × d2

3 – D shapes

Cube: Total Surface Area = $6a^2$
Curved Surface Area= $4a^2$
Volume: a^3

Cuboid: Total Surface Area = 2(lb + bh+ hl)
Curved Surface Area= 2(hl +hb)
Volume: l × b × h

Cylinder: Total Surface Area = $2\pi r(r + h)$
Curved Surface Area= $2\pi rh$
Volume: $\pi r^2 h$

Units of conversion: $1cm^3 = 1ml$ $1L = 1000cm^3$ $1m^3 = 1000L$

Laws of Exponents:

$(i)\ a^m \times a^n = a^{m+n}$ $(ii)\ \frac{a^m}{a^n} = a^{m-n}$

$(iii)\ (a^m)^n = a^{mn}$ $(iv)\ a^m \times b^m = (ab)^m$

$(v)\ \frac{a^m}{b^m} = \left(\frac{a}{b}\right)^m$ $(vi)\ a^0 = 1$

$(vii)\ \left(\frac{a^{-m}}{b^{-n}}\right) = \frac{b^n}{a^m}$ $(viii)\ \left(\frac{a}{b}\right)^{-m} = \left(\frac{b}{a}\right)^m$

- $a^n = 1 \Rightarrow n = 0$
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Direct and Inverse proportions:

Direct Proportions: $\frac{x1}{y1} = \frac{x2}{y2}$ Inverse Proportions: $\frac{x1}{x2} = \frac{y1}{y2}$

CLASS 9 (Maths)
Revision Notes

Chapter 2: Polynomials

- $(x + y)^2 = x^2 + 2xy + y^2$
- $(x - y)^2 = x^2 - 2xy + y^2$
- $(x + y)(x - y) = x^2 - y^2$
- $(x + a)(x + b) = x^2 + (a + b)x + ab$
- $(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca.$
- $(a + b)^3 = a^3 + b^3 + 3ab\,(a + b)$
- $(a - b)^3 = a^3 - b^3 - 3ab\,(a - b)$
- $a^3 + b^3 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$

Chapter 8: Quadrilaterals

A quadrilateral is a plane figure bounded by four sides.

Sides and Angles in Quadrilaterals:
(i) Two sides having a common end point are called adjacent sides.
(ii) Two sides having no common end point are called opposite sides.
(iii) Two angles of a quadrilateral having a common arm are called consecutive angles.
(iv)Two angles of a quadrilateral having no common arm are called its opposite angles.
Types of Quadrilaterals
(i) Parallelogram: A quadrilateral in which opposite sides are parallel is called a parallelogram.
(ii) Rectangle: A parallelogram, each of whose angle is 90º, is called a rectangle.

(iii) Square: A rectangle having all sides equal is called a square.

(iv) Rhombus: A parallelogram having all sides equal is called a rhombus.

(v) Trapezium: A quadrilateral in which two opposite sides are parallel and two opposite sides are nonparallel, is called a trapezium.

(vi) Kite: A quadrilateral in which two pairs of adjacent sides are equal is known as kite.

Properties of Parallelogram
(i) A diagonal of a parallelogram, divides it into two congruent triangles.
(ii) In a parallelogram, opposite sides are equal.
(iii) In a parallelogram, opposite angles are equal.
(iv) The diagonals of a parallelogram bisect each other.

Angle Sum Property of Quadrilateral

The sum of all the four angles of a quadrilateral is 360º

Mid-Point Theorem for Quadrilateral

Statement: The line segment joining the mid-points of any two sides of a triangle is parallel to the third side and equal to half of it.

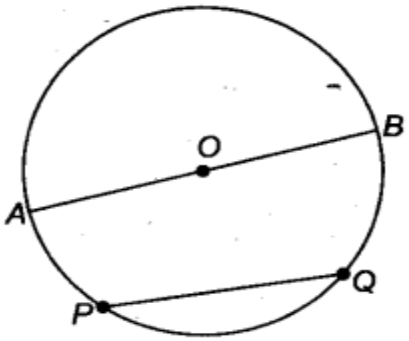
Converse of mid-point theorem: The line drawn through the mid-point of one side of a triangle parallel to another side, intersects the third side at its mid-point.

Chapter 10: Circles

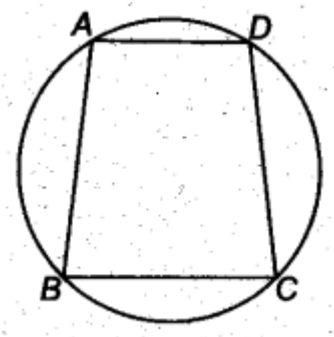
Circle: The collection of all points in a plane which are at a fixed distance from a fixed point in the plane is called a circle.

Basic Definition

- **Chord:** Suppose, we take any two points on a circle, then the line segment PQ is called the chord of the circle.



- **Diameter:** The chord which passes through the centre of the circle is called a diameter AB of the circle.
- **Arc:** A piece of a circle between two points is called an arc. If P and Q are any two points on them, the PQ is an arc of the circle and it is denoted by AB.
- **Circumference:** The length of the complete circle is called its circumference.
- **Semi-circle:** A diameter of a circle divides it into two equal parts which an arc. Each of these two arcs is called a semi-circle.
- **Congruent Circles (Arc):** Two circles are said to be congruent if and only if either of them can be superposed on the other so as to cover exactly.
- **Cyclic Quadrilateral:** A quadrilateral ABCD is called cyclic if all the four vertices of it lie on a circle.



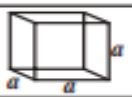
- **Common Chord:** The intersection point of two circles is the common chord of the circle.

Important Theorems

- The perpendicular from the centre of a circle to a chord bisects the chord and it is vice-versa.
- Equal chords of a circle (or of congruent circles) are equidistant from the centre.
- It two chords of a circle are equal, then their corresponding, arcs are congruent and conversely, if two arcs are congruent, then their corresponding chords are equal.
- Congruent arcs of a circle subtend equal angles at the centre.
- The angle subtended by an arc at the centre is double the angle subtended by it any point on the remaining part of the circle.
- Angle in the same segment of a circle is equal.
- The sum of either pair of opposite angles of a cyclic quadrilateral is 180° and vice-versa.
- The angle in a semi-circle is a right angle.

- If two chords of a circle are equal, then their corresponding arcs (minor, major or semi-circle) are congruent and vice-versa.

Chapter 13: Surface Area and Volume

Name of the solid	Figure	Lateral / Curved surface area	Total surface area	Volume	Nomen-clature
Cuboid		$2h(l+b)$	$2(lb+bh+hl)$	lbh	l:length b:breadth h:height
Cube		$4a^2$	$6a^2$	a^3	a:side of the cube
Regular circular Cylinder		$2\pi rh$	$2\pi r(r+h)$	$\pi r^2 h$	r:radius of the base h:height
Right circular cone		πrl	$\pi r(l+r)$	$\frac{1}{3}\pi r^2 h$	r:radius of the base h:height l:slant height
Sphere		$4\pi r^2$	$4\pi r^2$	$\frac{4}{3}\pi r^3$	r:radius
Hemisphere		$2\pi r^2$	$3\pi r^2$	$\frac{2}{3}\pi r^3$	r:radius

Chapter 15: Probability

Some Basic Definitions

(i) **Trial:** A single performance of a random experiment is known as a trial.
(ii) **Sample space:** The set consisting of all possible outcomes of a random experiment is known as sample space.
(lii) **Event:** A subset of the sample space of a random experiment is called an event.

Probability: Let n be the total number of trials and m be a favorable event. The empirical probability P(E) of an event E happening, is given by

$$P(E) = \frac{\text{Number of trials favourable to an event}}{\text{Total number of trials}} = \frac{m}{n}$$

Note: 1. The probability of any certain event is 1.

2. The probability of an impossible event ¡s 0.
3. $0 \le P(E) \le 1$

**********The End**********