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Maths Facts & Formulae

- The sum of the angles of a quadrilateral is 360° .
- A diagonal of a parallelogram divides it into two congruent triangles.
- PARALLELOGRAM:
 - Opposite sides are equal.
 - Opposite angles are equal.
 - Diagonal bisects each other.
 - Diagonals of a rectangle bisect each other.
 - Diagonals of a rhombus bisect each other.
 - Diagonals of a square bisect each other at right angles and are equal.
- Mid Point Theorem : the line segment joining the mid points of any two sides of a triangle is parallel to the third side and is half of it.
- A line through the mid point of a side of a triangle parallel to another side bisects the third side.
- The quadrilateral formed by joining the mid points of the sides of the quadrilateral in order is a parallelogram
- Equal chords of a circle subtend equal angles at the centre
- If the angles subtended by the chords of a circle at the centre are equal, then the chords are equal
- The perpendicular from the centre of a circle to a chord bisects the chord.
- The line drawn through the centre of a circle to bisect a chord is perpendicular to the chord.
- There is one and only one circle passing through three given non-collinear points.
- Equal chords of a circle (or of congruent circles) are equidistant from the centre (or centres)
- Chords equidistant from the centre of a circle are equal in length. Congruent arcs (or equal 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 at any point on the remaining part of the circle.

- Angles in the same segment of a circle are equal.
- If a line segment joining two points subtends equal angles at two other points lying on the same side of the line containing the line segment, the four points lie on a circle (i.e. they are concyclic)
- The sum of either pair of opposite angles of a cyclic quadrilateral is 180°
- If the sum of either pair of opposite angles of quadrilateral is 180° then the quadrilateral is cyclic
- Two congruent figures have equal areas but the converse need not be true.
- Two figures are said to be on the same base and between the same parallels, if they have a common base (side) and the vertices, (or the vertex) opposite to the common base of each figure lie on a line parallel to the base.
- Parallelograms on the same base (or equal bases) and between the same parallels are equal in area.
- Area of a parallelogram is the product of its base and the corresponding altitude.
- Parallelograms on the same base (or equal bases) and having equal areas lie between the same parallels.
- If a parallelogram and a triangle are on the same base and between the same parallels, then area of the triangle is half the area of the parallelogram.
- Triangles on the same base (or equal bases) and between the same parallels are equal in area.
- Area of a triangle is half the product of its base and the corresponding altitude.
- Triangles on the same base (or equal bases) and having equal areas lie between the same parallels.
- A median of a triangle divides it into two triangles of equal areas.
- Axioms or postulates are the assumptions which are obvious universal truths. They are not proved.
- Theorems are statements which are proved, using definitions, axioms, previously proved statements and deductive reasoning.

Some of Euclid's axioms were:

- Things which are equal to the same thing are equal to one another.
- If equals are added to equals, the wholes are equal.
- If equals are subtracted from equals, the remainders are equal.
- Things which coincide with one another are equal to one another.
 - The whole is greater than the part.
- Things which are double of the same things are equal to one another.
- Things which are halves of the same things are equal to one another.
- Euclid's postulates were :
 - Postulate 1 : A straight line may be drawn from any one point to any other point.
 - Postulate 2 : A terminated line can be produced indefinitely.
 - Postulate 3 : A circle can be drawn with any centre and any radius.
 - Postulate 4 : All right angles are equal to one another.

- Postulate 5 : If a straight line falling on two straight lines makes the interior angles on the same side of it taken together less than two right angles, then the two straight lines, if produced indefinitely, meet on that side on which the sum of angles is less than two right angles.
- To locate the position of an object or a point in a plane, we require two perpendicular lines. One of them is horizontal, and the other is vertical.
- The plane is called the Cartesian, or coordinate plane and the lines are called the coordinate axes
- The horizontal line is called the x -axis, and the vertical line is called the y - axis.
- coordinate axes divide the plane into four parts called quadrants.
- The point of intersection of the axes is called the origin.
- The distance of a point from the y - axis is called its x-coordinate, or abscissa, and the distance of the point from the x-axis is called its y-coordinate, or ordinate.
- If the abscissa of a point is x and the ordinate is y , then (x, y) are called the coordinates of the point.
- The coordinates of a point on the x-axis are of the form $(x, 0)$ and that of the point on the y-axis are $(0, y)$.
- The coordinates of the origin are $(0, 0)$.
- The coordinates of a point are of the form $(+, +)$ in the first quadrant, $(-, +)$ in the second quadrant, $(-, -)$ in the third quadrant and $(+, -)$ in the fourth quadrant, where $+$ denotes a positive real number and $-$ denotes a negative real number

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