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A quadrilateral is a shape with four sides. A parallelogram is a quadrilateral that has two pairs of parallel sides (i.e. the sides opposite each other are parallel). A rectangle, for example, is a parallelogram. A trapezoid, however, is an example of a quadrilateral that is not a parallelogram - it has four sides, but only two of them are parallel to each other. Quadrilateral just means "four sides"(quad means four, lateral means side). A Quadrilateral has four-sides, it is 2-dimensional (a flat shape), closed (the lines join up), and has straight sides. geometry/images/geom-quad.js?mode=choose(Also see this on Interactive Quadrilaterals) Properties A quadrilateral has: four sides (edges) four vertices (corners) interior angles that add to 360 degrees: Try drawing a quadrilateral, and measure the angles. They should add to 360 Types of Quadrilaterals There are special types of quadrilateral: Some types are also included in the definition of other types! For example a square, rhombus and rectangle are also parallelograms. See below for more details. Let us look at each type in turn: The Rectangle the little squares in each corner mean "right angle" A rectangle is a four-sided shape where every angle is a right angle (90). Also opposite sides are parallel and of equal length. The Square the little squares in each corner mean "right angle" A square has equal sides (marked "s") and every angle is a right angle (90) Also opposite sides are parallel. A square also fits the definition of a rectangle (all angles are 90), and a rhombus (all sides are equal length). The Rhombus A rhombus is a four-sided shape where all sides have equal length (marked "s"). Also opposite sides are parallel and opposite angles are equal. Another interesting thing is that the diagonals (dashed lines) meet in the middle at a right angle. In other words they "bisect" (cut in half) each other at right angles. A rhombus is sometimes called a rhomb or a diamond. The Parallelogram A parallelogram has opposite sides parallel and equal in length. Also opposite angles are equal (angles "A" are the same, and angles "B" are the same). NOTE: Squares, Rectangles and Rhombuses are all Parallelograms! A parallelogram with: all sides equal and angles "A" and "B" as right angles is a square! The Trapezoid (UK: Trapezium) Trapezoid Isosceles Trapezoid A trapezoid (called a trapezium in the UK) has a pair of opposite sides parallel. And a trapezium (called a trapezoid in the UK) is a quadrilateral with NO parallel sides: Trapezoid Trapezium In the US: a pair of parallel sides NO parallel sides In the UK: NO parallel sides a pair of parallel sides (the US and UK definitions are swapped over!) An Isosceles trapezoid, as shown above, has left and right sides of equal length that join to the base at equal angles. The Kite Hey, it looks like a kite (usually). It has two pairs of sides: Each pairis made of two equal-length sides that join up. Also: the angles where the two pairs meet are equal. the diagonals, shown as dashed lines above, meet at a right angle. one of the diagonals bisects (cuts equally in half) the other. ... and that's it for the special quadrilaterals. Irregular Quadrilaterals The only regular (all sides equal and all angles equal) quadrilateral is a square. So all other quadrilaterals are irregular. The "Family Tree" Chart Quadrilateral definitions are inclusive. So we include a square in the definition of a rectangle. (We don't say "Having all 90 angles makes it a rectangle except when all sides are equal then it is a square.") This may seem odd, as in daily life we think of a square as not being a rectangle ... but in mathematics it is. Using the chart below we can answer such questions as: Is a Square a type of Rectangle? (Yes) Is a Rectangle a type of Kite? (No) Complex Quadrilaterals Oh Yes! when two sides cross over, we call it a "Complex" or "Self-Intersecting" quadrilateral, like these: They still have 4 sides, but two sides cross over. Polygon A quadrilateral is a polygon. In fact it is a 4-sided polygon, just like a triangle is a 3-sided polygon, a pentagon is a 5-sided polygon, and so on. Play with Them Now that you know the different types, you can play with the Interactive Quadrilaterals. Other Names A quadrilateral can sometimes be called: a Quadrangle ("four angles"), so it sounds like "triangle" a Tetragon ("four polygon"), so it sounds like "pentagon", "hexagon", etc. 621,622,623,624,763,764, 2128, 2129, 3230, 3231 Copyright 2024 Rod PierceYes, a parallelogram is always a quadrilateral. A quadrilateral is a polygon with four sides, and a parallelogram is a specific type of quadrilateral where opposite sides are parallel and equal in length. So, every parallelogram has four sides, making it a quadrilateral.Analogy / ExampleIn Exercises \(55-60\) , decide whether \(JKLM\) is a rectangle, a rhombus, or asquare. Give all names that apply. Explain your reasoning. $$ \mathrm{J}(3,1), \mathrm{K}(3,-3), \mathrm{L}(-2,-3), \mathrm{M}(-2,1) $$ A parallelogram is a two-dimensional geometrical shape whose sides are parallel to each other. It is a type of polygon having four sides (also called quadrilateral), where the pair of parallel sides are equal in length. TheSum of adjacent angles of a parallelogram is equal to 180 degrees. In geometry, you must have learned about many 2D shapes and sizes such as circles, squares, rectangles, rhombus, etc. All of these shapes have a different set of properties. Also, the area and perimeter formulas of these shapes vary from each other and are used to solve many problems. Let us learn here the definition, formulas and properties of a parallelogram. Parallelogram DefinitionA parallelogram is a quadrilateral with two pairs of parallel sides. The opposite sides of a parallelogram are equal in length, and the opposite angles are equal in measure.Also, the interior angles on the same side of the transversal are supplementary. The Sum of all the interior angles equals 360 degrees.A three-dimensional shape that has its faces in a parallelogram shape is called a parallelepiped. The area of the parallelogram depends on the base (one of its parallel sides) and its height (altitude drawn from top to bottom) of it. The perimeter of a parallelogram depends on the length of its four sides.A square and a rectangle are two shapes which have similar properties to a parallelogram.Rhombus: If all the sides of a parallelogram are congruent or equal to each other, then it is a rhombus.If there is one parallel side and the other two sides are non-parallel, then it is a trapezium.See the figure below:In the figure above, you can see, ABCD is a parallelogram, where AB || CD and AD || BC.Also, AB = CD and AD = BCAnd,A =C &B =DAlso, A & D are supplementary angles because these interior angles lie on the same side of the transversal. In the same way, B & C are supplementary angles.Therefore,A + D = 180B + C = 180Facts:Number of sides = 4Number of vertices = 4Mutually Parallel sides = 2 (in pair)Area = Base x HeightPerimeter = 2 (Sum of adjacent sides length)Type of polygon = Quadrilateral Shape of ParellelogramA parallelogram is a two-dimensional shape. It has four sides, in which two pairs of sides are parallel. Also, the parallel sides are equal in length. If the length of the parallel sides is not equal in measurement, then the shape is not a parallelogram. Similarly, the opposite interior angles of a parallelogram should always be equal. Otherwise, it is not a parallelogram.Special ParallelogramsSquare and Rectangle: A square and a rectangle are two shapes which have similar properties to a parallelogram. Both have their opposite sides equal and parallel to each other. Diagonals of both shapes bisect each other.Rhombus: If all the sides of a parallelogram are congruent or equal to each other, then it is a rhombus.Rhomboid: A special case of a parallelogram that has its opposite sides parallel to each other, but adjacent sides are of unequal lengths. Also, the angles are non-right angles.Trapezium: If there is one pair of side parallel and the other two sides are non-parallel, then it is a trapezium.Angles of ParallelogramA parallelogram is a flat 2d shape which has four angles. The opposite interior angles are equal. The angles on the same side of the transversal are supplementary, that means they add up to 180 degrees. Hence, the sum of the interior angles of a parallelogram is 360 degrees. Properties of ParallelogramIf a quadrilateral has a pair of parallel opposite sides, its a special polygon called Parallelogram. The properties of a parallelogram are as follows:The opposite sides are parallel and equalThe opposite angles are equalThe consecutive or adjacent angles are supplementaryIf any one of the angles is a right angle, then all the other angles will be at right angleThe two diagonals bisect each otherEach diagonal bisects the parallelogram into two congruent trianglesThe Sum of the square of all the sides of a parallelogram is equal to the sum of the square of its diagonals. It is also called parallelogram lawAlso, read: Formulas (Area & Perimeter)The formula for the area and perimeter of a parallelogram is covered here in this section. Students can use these formulas and solve problems based on them.Area of ParallelogramArea of a parallelogram is the region occupied by it in a two-dimensional plane. Below is the formula to find the parallelogram area:Area = Base HeightIn the above figure, ||gramABCD, Area is given by;Area = a b sin A = b a sin Bwhere a is the slant length of the side of ||gramABCD and b is the base.Check here:Area of a Parallelogram FormulaPerimeter of ParallelogramThe perimeter of any shape is the total distance covered around the shape or the total length of any shape. Similarly, theperimeter of a parallelogramis the total distance of the boundaries of the parallelogram. To calculate the perimeter value, we have to know the values of its length and breadth. The parallelogram has its opposite sides equal in length. Therefore, the formula to calculate the perimeter is written as;Perimeter = 2 (a+b) unitsWhere a and b are the length of the sides of the parallelogram.Types of ParallelogramThere are mainly four types of parallelograms, depending on various factors. The factors which distinguish between all of these different types of parallelogram are angles, sides etc.In a parallelogram, say PQRSIf PQ = QR = RS = SP are the equal sides, then its a rhombus. All the properties are the same for rhombus as for parallelogram.Other two special types of a parallelogram are: Is Square a Parallelogram?Yes, a square is considered as a parallelogram since the opposite sides are parallel to each other, and the diagonals of the square bisect each other.Is Rectangle a Parallelogram?Yes, a rectangle is also a parallelogram, because it satisfies the conditions or meets the properties of parallelogram such as the opposite sides are parallel and diagonals bisect each other.Parallelogram TheoremsTheorem 1:Parallelograms on the same base and between the same parallel sides are equal in area.Proof:Two parallelograms ABCD and ABEF, on the same base DC and between the same parallel line AB and FC.To prove that area (ABCD) = area (ABEF).Proof:Consider the above figure In ADF and BCE,AD = BC (Since, ABCD is a parallelogram AD=BC)AF = BE (Since, ABEF is a parallelogram AF=BE)ADF = BCE (Corresponding Angles)AFD = BEC (Corresponding Angles)DAF = CBE (Angle Sum Property)Therefore, ADE BCF (From SAS-rule)Area(ADF) = Area(BCE) (By congruence area axiom)Area(ABCD) = Area(ABED) + Area(BCE)Area(ABCD) = Area(ABED)+Area(ADF)Area(ABCD) = Area(ABEF)Hence, the area of parallelograms on the same base and between the same parallel sides is equal.CorollaryA parallelogram and a rectangle on the same base and between the same parallels are equal in area.Proof:Since a rectangle is also a parallelogram so, the result is a direct consequence of the above theorem.Theorem:The area of a parallelogram is the product of its base and the corresponding altitude.Given:In a parallelogram ABCD, AB is the base.To provethat Area(||gmABCD) = ABALConstruction:Complete the rectangle ALMB by Drawing BM perpendicular to CD.Consider the figure given below:Parallelogram ABCD and rectangle ABML are on the same base and between the same parallels AB and LC.area of parallelogram ABCD = area of parallelogram ABMLWe know that area of a rectangle = length x breadth.Therefore, area of parallelogram ABCD = AB x ALHence, the area of a parallelogram is the product of any base of it and the corresponding altitude. Difference Between Parallelogram and RhombusParallelogramRhombusA quadrilateral that has its opposite sides equal and parallelA quadrilateral that has all its sides congruentDiagonals bisect each otherDiagonals bisect each other at 90 degreesOpposite angles are of equal measureOpposite angles are of equal measure Examples on ParallelogramExample 1:Find the area of a parallelogram whose base is 5 cm and height is 8 cm.Solution-:Given, Base = 5 cm and Height = 8 cm.We know, Area = Base x HeightArea = 5 8Area = 40 Sq.cmExample 2: Find the area of a parallelogram having a length of diagonals to be 10 and 22 cm and an intersecting angle to be 65 degrees.Solution:We know that the diagonals of a parallelogram bisect each other. Hence, half the diagonal length will be 5 and 11 cm.The angle opposite to the side b comes out to be 180 65 = 115 We use the law of cosines to calculate the base of the parallelogram b = 5 + 11 2(11)(5)cos(115)b = 25 + 121 110(-0.422)b = 192.48b = 13.87 cm.After finding the base, we need to calculate the height of the given parallelogram.To find the height, we have to calculate the value of , so we use the sine law5/sin() = b/sin(115) = 19.06Now we extend the base and draw in the height of the figure and denote it as h.The right-angled triangle (marked with a red line) has the Hypotenuse to be 22 cm and the Perpendicular to be h.Sosin = h/22h = 7.184 cmArea = base heightA = 13.87 7.184A = 99.645 sq.cmHope this discussion has cleared all your doubts regarding parallelograms and their properties. Register with BYJUS to learn more about quadrilaterals and other Maths concepts.Video LessonA parallelogram is a quadrilateral that has its opposite sides parallel and equal to each other. It has its interior opposite angles equal. Also, the angles on the same side of the transversal sum up to 180 degrees or are supplementary to each other.The parallelogram is quadrilateral which has two pairs of opposite sides parallel and equal. Also, the opposite angles are of equal measure. Examples of shapes that hold the same properties are:SquareRectangleRhombusA kit and a trapezium cannot be considered as a parallelogram, as they dont have two pairs of parallel sides.The area of a parallelogram is the region occupied by it in a two-dimensional plane. Its formula is:Area = Base x Height (in square unit)The area of a parallelogram without height is given by:Area = ab sin xWhere a and b are the two adjacent sides of a parallelogram and x is the angle between them.Perimeter is the total length of boundaries of a parallelogram. It is equal to the sum of all four sides.Perimeter = 2(a+b)A parallelogram is a four-sided two-dimensional shape with two pairs of sides parallel and equal.Opposite sides are parallel and congruentOpposite angles are congruentConsecutive angles are supplementaryDiagonals bisect each other A parallelogram is a quadrilateral in which the opposite sides are parallel and equal. Parallelograms are classified into three main types: square, rectangle, and rhombus, and each of them has its own unique properties. In this article, let us learn about the parallelogram shape, the parallelogram definition, the different types of parallelograms, how to find the area of a parallelogram and parallelogram examples. What is a Parallelogram? A parallelogram is a special kind of quadrilateral that is formed by parallel lines. The angle between the adjacent sides of a parallelogram may vary but the opposite sides need to be parallel for it to be a parallelogram. A quadrilateral will be a parallelogram if its opposite sides are parallel and congruent.Parallelogram DefinitionA parallelogram is defined as a quadrilateral in which both pairs of opposite sides are parallel and equal. Observe the following figure which shows the three types of parallelograms:Properties of a Parallelogram There are some basic properties that help us to identify a parallelogram. Observe the following parallelogram PQTR to relate to its properties given below.We can identify and distinguish a parallelogram with the help of the following properties:The opposite sides of a parallelogram are parallel. Here, PQ RT and PR QT.The opposite sides of a parallelogram are equal. Here, PQ = RT and PR = QTThe opposite angles of a parallelogram are equal. Here, P = T and Q = RThe diagonals of a parallelogram bisect each other. Here, RE = EQ and PE = ETSame-side interior angles supplement each other. Here, PRT + RTQ = 180, RTQ + TQP = 180, TQP + QPR = 180, QPR + PRT = 180The diagonals divide the parallelogram into two congruent triangles. Here, RPQ is congruent to QTR, and RPT is congruent to QTPTypes of Parallelogram A parallelogram can be divided into various types depending upon the different properties. It is mainly divided into three special types: Let us study these parallelograms in detail.RectangleA rectangle is a parallelogram with two pairs of equal and parallel opposite sides and four right angles.Observe the rectangle ABCD to relate it with the following properties. A rectangle has:Two pairs of parallel sides. Here, AB || DC and AD || BCFour right angles. Here, A = B = C = D = 90Opposite sides of equal lengths. Here, AB = DC and AD = BCTwo equal diagonals. Here, AC = BDDiagonals that bisect each other.SquareA square is a parallelogram with four equal sides and four right angles.Observe the square ABCD to relate it with the following properties. A square has:Four equal sides. Here, AB = BC = CD = DAFour right angles. Here, A = B = C = D = 90Two pairs of parallel sides. Here, AB || DC and AD || BCTwo equal diagonals. Here, AC = BDDiagonals that are perpendicular to each other. Here, ACBDDiagonals that bisect each other.RhombusA rhombus is a parallelogram with four equal sides in which the opposite angles are equal.Observe the rhombus EFGH to relate it with the following properties. A rhombus has:Two pairs of parallel sides. Here, EH || FG and EF || HGFour equal sides. Here, EH = HG = GF= FEEqual opposite angles. Here, E = G and H = FDiagonals that are perpendicular to each other. Here, EGHFDiagonals that bisect each other.Parallelogram Formulas Every two-dimensional figure has two basic formulas area as well as the perimeter. Let us discuss these two formulas of a parallelogram in this section.Area of ParallelogramThe area of a parallelogram is the space enclosed between the four sides of a parallelogram. It can be calculated if we know the length of the base and the height of the parallelogram and it is measured in square units like cm2, m2, and inch2. Observe the following parallelogram which shows the base and the height.Consider the parallelogram PQRS with base (b) and height (h). The area of the parallelogram is calculated with the help of the formula: Area of Parallelogram = Base (b) Height (h)Perimeter of ParallelogramThe perimeter of a parallelogram is the total length of its boundary and hence it is equal to the sum of all its sides.Thus, the perimeter (P) of a parallelogram with sides is, P = 2 (a + b)Related TopicsCheck out the following articles related to parallelograms.Angles of a ParallelogramParallelogram WorksheetsParallelogram CalculatorExample 1: In the given parallelogram ABCD, A = 90. Show that all its angles are equal to 90.Solution:Applying the parallelogram properties, we know that the opposite angles are equal. Therefore, A = C = 90We also know that the adjacent angles of a parallelogram are supplementary. Therefore, A+D = 180 D = 180 90 (A = 90) D = 90Since all the three angles of the parallelogram are measured 90, the fourth angle will also be equal to 90. B = 90Answer: A = B = C = D = 90Example 2: Prove that when the diagonals of a parallelogram bisect each other at 90, it is a rhombus.Solution:Consider the parallelogram ABCD.First, let us prove that AEB and AED are congruent.AE = AE (common)BE = ED (given)AEB = AED = 90 (given)Therefore, by SAS Congruency, AEB and AED are congruent.AB = ADSimilarly, considering congruent triangles AED and CEDAD = DCThis shows that: AB = BC = CD = AD, which proves that this parallelogram is a rhombus.Answer: Therefore, the given parallelogram is a rhombus.Example 3: State true or false:a.) The opposite sides of a parallelogram are parallel.b.) The diagonals of a parallelogram do not bisect each other.Solution:a.) True, the opposite sides of a parallelogram are parallel.b.) False, the diagonals of a parallelogram always bisect each other.View More >go to slidego to slidego to slideBreak down tough concepts through simple visuals.Math will no longer be a tough subject, especially when you understand the concepts through visualizations.Book a Free Trial ClassFAQs on Parallelogram A parallelogram is a quadrilateral which is made up of 2 pairs of parallel sides. In a parallelogram, the opposite sides are parallel and equal in length. A few examples of a parallelogram are rhombus, rectangle, and square.What is the Difference Between a Parallelogram and a Quadrilateral?All parallelograms are quadrilaterals but all quadrilaterals are not necessarily parallelograms. For example, a trapezoid is a quadrilateral, but not a parallelogram. For a quadrilateral to be a parallelogram, all the opposite sides must be parallel and equal to each other.What is the Perimeter of Parallelogram?A parallelogram is a special kind of quadrilateral in which the opposite sides are parallel and equal. The perimeter of a parallelogram is the sum of the length of all its sides and it is calculated with the help of the formula: Perimeter = 2(a + b); where 'a' and 'b' are the two sides of the parallelogram.What is the Area of a Parallelogram?The area of a parallelogram is the region covered by its boundary. The formula for the area of a parallelogram is: Area = b h; where 'b' is the length of the base of the parallelogram, and 'h' is the height of the parallelogram.Is a Rhombus a Parallelogram?Yes, a rhombus is a parallelogram in which the opposite sides are parallel and the opposite angles are congruent. Apart from this, all the sides of a rhombus are equal and the diagonals bisect each other at right angles.Is a Trapezoid a Parallelogram?No, a trapezoid is not a parallelogram, since all opposite sides of the trapezoid are not parallel to each other. A trapezoid has only one pair of opposite sides parallel to each other. Also, a trapezoid doesn't have opposite sides equal to each other. Hence, it is a quadrilateral but not a parallelogram.Is a Rectangle a Parallelogram?Yes, a rectangle is a parallelogram in which the opposite sides are parallel and equal. Apart from this, all the angles of a rectangle are congruent and it has equal diagonals that bisect each other.What are the Three Special Parallelograms?The three special parallelograms are rectangle, square, and rhombus. All three figures fulfill the properties of a parallelogram because they are four-sided and they have 2 pairs of sides that are parallel and equal.Do Angles in a Parallelogram Sum Up to 360?Yes, all the four interior angles of a parallelogram sum up to 360. For example, in a parallelogram ABCD, sum of A + B + C + D = 360.Are all the Angles of a Parallelogram Equal?No, all the angles of a parallelogram are not equal. Only the opposite angles of a parallelogram are equal and the consecutive (adjacent) angles of a parallelogram are always supplementary.What is the Difference Between Trapezoid and Parallelogram?A trapezoid is different from a parallelogram since all the opposite sides of a trapezoid are not parallel to each other. A trapezoid has only one pair of opposite sides parallel to each other.What is the Shape of a Parallelogram?A parallelogram is a four-sided polygon in which the opposite sides are always parallel and equal.How many Vertices does a Parallelogram have?A parallelogram is a quadrilateral and that is why it has 4 vertices (4 corners).Are all Parallelogram Sides Congruent?In a parallelogram, all sides may not be necessarily congruent. The opposite sides are parallel and equal (congruent). However, square is the only parallelogram in which all sides are congruent.How many Types of Parallelograms are there?A parallelogram can be divided into three special types depending on the different properties that they have. Q1: The base and the height of a parallelogram are 9 cm and 4 cm respectively. Find the area of the parallelogram.$$6 sq. cm$$$$18 sq. cm$$$$64 sq. cm$$$$36 sq. cm$$Q2: The height and the base of a parallelogram are in the ratio 5 : 6. If the area of the parallelogram is 1080 sq. cm. Determine its height and base.29 cm, 30 cm20 cm, 16 cm10 cm, 12 cm 30 cm, 36 cmQ3: By what factor will the perimeter of the parallelogram increase if the sides of a parallelogram are tripled.1/3623Q4: Find the base of a parallelogram if its area is 150 square units and height is 15 units.20 units12 units18 units10 unitsQ5: The perimeter of a parallelogram is 58 units. If one of the parallel sides is 16 units, then find the measure of the other parallel side.17 units10 units14 units13 units A parallelogram is a special type of quadrilateral that has both pairs of opposite sides parallel and equal. The given figure shows a parallelogram ABCD, which has AB II CD and AD II BC. Also, AD = BC and AB = CD. Non-Example: A trapezium is a non-example of a parallelogram. Identify Kite, Rhombuses and Parallelograms Game Play More Games When we look around us, we can see multiple parallelogram-like shapes and objects in the form of buildings, tiles, or paper. Buildings: Many buildings are constructed, keeping in mind the shape of parallelograms. A famous real-life illustration is the Dockland Office Building in Hamburg, Germany. Tiles: Tiles come in various shapes and sizes. One of the most found tile shapes is a parallelogram. Eraser: Everyone is familiar with the classic eraser. Erasers, too, come in several shapes and sizes, one of them being that of a parallelogram. The faces of this eraser are in the shape of a parallelogram. In a parallelogram, the opposite sides are parallel to each other. Here, AB || CD and AC || BD. The opposite sides of a parallelogram are equal in length. Here, AB = CD and AC = BD The measurement of opposite angles of a parallelogram is equal. Here, A = C and B = D Like all other quadrilaterals, the sum of all the angles of a parallelogram is 360. The adjacent or the adjoining angles of a parallelogram add up to 180. Therefore, A + B = 180, B + C = 180, C + D = 180, and D + A = 180. The diagonals of a parallelogram bisect each other. Here, OB = OD, and OA = OC. The diagonals AC and BD in the figure divide the parallelogram into two congruent triangles. There are three unique kinds of parallelograms: Rhombus: A rhombus is a parallelogram in which all sides are equal. Here, AB = BC = CD = DA. ABCD is a rhombus. Square: A square is a parallelogram where all sides and diagonals are equal. The angles are right angles. Here, AB = BC = CD = DA and A = B =C =D = 90 degrees and also AD = BC. ABCD is a square.Rectangle: A rectangle is a parallelogram in which all angles are 90, and the diagonals are equal. The opposite sides have equal lengths. Here all angles are right angles. Diagonals PN and OM are equal. MNOP is a rectangle. The area of a parallelogram is given by the formula A = bh, where b is the length of the base, and h is the height. The perimeter of a parallelogram equals the sum of the lengths of the four sides. Since the opposite sides of a parallelogram are equal, its perimeter can also be expressed as 2 x the sum of adjacent sides, i.e., 2 (AB + BC) SplashLearn is transforming education for elementary school kids from Kindergarten to Grade 5. SplashLearn motivates kids to study math through highly engaging and personalized programs. Available across all digital platforms, it has been used by over 40 million kids worldwide. Example 1 In the figure below, ABCD is a parallelogram where DAB = 75 and CBD = 60. Calculate BDC. Solution: As we know, the opposite angles of a parallelogram are equal. Therefore, DCB = DAB = 75. We also know that the sum of the angles of a triangle is 180. Now, consider BCD. Here, BDC + DCB + CBD = 180 We know that DCB = DAB = 75. Therefore, BDC + DCB + CBD = 180 BDC + 75 + 60 = 180 BDC + 135 = 180 BDC = 180 135 = 45 Therefore, BDC = 45 Example 2 Find the area of this parallelogram with a base of 15 centimeters and a height of 6 centimeters. Solution: A = b h A = (15 cm) (6 cm) A = 90 cm2 Example 3 Two adjacent sides of a parallelogram are 5 cm and 3 cm. Find its perimeter. Solution: We know that opposite sides of a parallelogram are equal. Suppose we have a parallelogram ABCD, then: AB = CD = 5 cm and BC = AD = 3 cm Perimeter of parallelogram = 2 (AB + BC) = 2 (5 + 3) cm = 16 cm Attend this Quiz & Test your knowledge.Correct answer is: 40mPermieter of a parallelogram = 2 x sum of adjacent sides = 2 (12m + 8m) = 40m Correct answer is: TrapeziumA parallelogram has both the pair of opposite sides as parallel and equal, whereas a trapezium has only one pair of parallel sides and no equal sides.Correct answer is: 120Opposite angles of a parallelogram are equal. So A = C = 60 and also B = D Also, A + B + C + D = 360 60 + B + 60 + D = 360 120 + B + D = 360 B + D = 240 and B = D Therefore, D = 120 Is a trapezium a parallelogram? No, a trapezium is not a parallelogram because there are two pairs of parallel sides in a parallelogram, whereas a trapezium has only one pair of parallel sides. Are all rectangles parallelograms? Yes, all rectangles are parallelograms because a rectangle has two sets of parallel sides and two pairs of opposite sides that are equal. Therefore, it abides by all the properties of a parallelogram. Are all parallelograms rectangles? No, a parallelogram is not always a rectangle. In a rectangle, all angles must be equal to 90. But for a parallelogram, no angles need to be equal to 90. Do diagonals of a parallelogram always bisect each other? Yes, diagonals of a parallelogram always bisect each other. Is it necessary that all sides be equal in a quadrilateral to be a parallelogram? No, a parallelogram does not have all sides equal. Only opposite sides of a parallelogram are equal. Share copy and redistribute the material in any medium or format for any purpose, even commercially. Adapt remix, transform, and build upon the material for any purpose, even commercially. The licensor cannot revoke these freedoms as long as you follow the license terms. Attribution You must give appropriate credit , provide a link to the license, and indicate if changes were made . You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use. ShareAlike If you remix, transform, or build upon the material, you must distribute your contributions under the same license as the original. No additional restrictions You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits. You do not have to comply with the license for elements of the material in the public domain or where your use is permitted by an applicable exception or limitation . No warranties are given. The license may not give you all of the permissions necessary for your intended use. For example, other rights such as publicity, privacy, or moral rights may limit how you use the material. ,the free encyclopedia that anyone can edit.117,185 active editors 7,001,773 articles in EnglishThe English-language Wikipedia thanks its contributors for creating more than seven million articles! Learn how you can take part in the encyclopedia's continued improvement.Members of the victorious Blondie crewThe Boat Race 2018 took place on 24March. Held annually, The Boat Race is a side-by-side rowing race between crews from the universities of Oxford and Cambridge along a 4.2-mile (6.8km) tidal stretch of the River Thames in south-west London, England. For the third time in the history of the event, the men's, the women's and both reserves' races were all held on the Tideway on the same day. The women's race saw Cambridge lead from the start, eventually winning by a considerable margin to take the overall record to 4330 in their favour. In the women's reserve race, Cambridge's Blondie (crew pictured) defeated Oxford's Osiris by nine lengths. The men's reserve race was won by Cambridge's Goldie, who defeated Oxford's Isis by a margin of four lengths. The men's race was the final event of the day and completed a whitewash as Cambridge won, taking the overall record to 8380 in their favour. The races were watched by around 250,000 spectators live, and broadcast around the world. (Fullarticle...)Recently featured: Radar, Gun Laying, Mk.I and Mk.IIAndrea NavageroNosy KombaArchiveBy emailMore featured articlesAboutKitty Marion... that Kitty Marion (pictured) was force-fed over 200 times during a hunger strike?... that the North Korean destroyer Choe Hyon is the largest ship constructed for the Korean People's Navy?... that after the release of High and Low, director Akira Kurosawa received telephone calls imitating his film that threatened to kidnap his daughter?... that May Bradford Shockley is why Silicon Valley is where it is?... that the conservation of a goat might endanger the survival of Aquilegia pauii?... that Joy Laking predicted in a school writing assignment that within ten years she would be making a living as an artist?... that the Taiwanese restaurant chain Formosa Chang drew inspiration from McDonald's for its non-greasy atmosphere and corporate practices?... that Haridas Mitra had his death sentence commuted after the intervention of Mahatma Gandhi?... that "Steve's Lava Chicken" recently became the shortest song to enter the UK Top 40?ArchiveStart a new articleNominate an articleNgg wa Thiong'oKenyan writer and activist Ngg wa Thiong'o (pictured) dies at the age of 87.In sumo, nosato Daiki is promoted to yokozuna.In association football, Liverpool win the Premier League title.In motor racing, lex Palou wins the Indianapolis 500.In basketball, the EuroLeague concludes with Fenerbahe winning the Final Four Playoff.Ongoing: Gaza warM23 campaignRussian invasion of UkrainetimelineSudanese civil wartimelineRecent deaths: Harrison Ruffin TylerPhil RobertsonMary K. GaillardPeter DavidAlan YentobGerry ConnollyNominate an articleMay 31: Dragon Boat Festival in China and Taiwan (2025); World No Tobacco DayBessarion455 Petronius Maximus, the ruler of the Western Roman Empire, was stoned to death by a mob as he fled Rome ahead of the arrival of a Vandal force that sacked the city.1223 Mongol invasion of Kievan Rus': Mongol forces defeated a Kievan Rus' army at the Battle of the Kalka River in present-day Ukraine.1468 Cardinal Bessarion (pictured) announced his donation of 746 Greek and Latin codices to the Republic of Venice, forming the Biblioteca Marciana.1935 A magnitude-7.7 earthquake struck Balochistan in British India, now part of Pakistan, killing between 30,000 and 60,000 people.2013 A tornado struck Central Oklahoma, killing eight people and injuring more than 150 others.Albertino Mussato (d.1329)Joseph Grimaldi (d.1837)Dina Boluarte (b.1962)Mbaye Diagne (d.1994)More anniversaries: May 30May 31June 1ArchiveBy emailList of days of the yearAboutCucumis metuliferus, the African horned cucumber, is an annual vine in the cucumber and melon family, Cucurbitaceae. Its fruit has horn-like spines, hence the name "horned melon". The ripe fruit has orange skin and lime-green, jelly-like flesh. It is native to Southern Africa, where it is a traditional food. Along with the gemsbok cucumber and the citron melon, it is one of the few sources of water during the dry season in the Kalahari Desert. This photograph, which was focus-stacked from 25 separate images, shows two C.metuliferus fruits, one whole and the other in cross-section.Photograph credit: Ivar LeidusRecently featured: Ignace TonenAustralian white ibisHell Gate BridgeArchiveMore featured picturesCommunity portal The central hub for editors, with resources, links, tasks, and announcements.Village pump Forum for discussions about Wikipedia itself, including policies and technical issues.Site news Sources of news about Wikipedia and the broader Wikimedia movement.Teahouse Ask basic questions about using or editing Wikipedia.Help desk Ask questions about using or editing Wikipedia.Reference desk Ask research questions about encyclopedic topics.Content portals A unique way to navigate the encyclopedia.Wikipedia is written by volunteer editors and hosted by the Wikimedia Foundation, a non-profit organization that also hosts a range of other volunteer projects: CommonsFree media repository MediaWikiWiki software development Meta-WikiWikimedia project coordination WikibooksFree textbooks and manuals WikidataFree knowledge base WikinewsFree-content news WikiquoteCollection of quotations WikisourceFree-content library WikispeciesDirectory of species WikiversityFree learning tools WikivoyageFree travel guide WiktionaryDictionary and thesaurusThis Wikipedia is written in English. Many other Wikipedias are available; some of the largest are listed below. 1,000,000+ articles DeutschEspaolFranaisItalianoNederlandsPolskiPortuguesSvenskaTing Vit 250,000+ articles Bahasa IndonesiaBahasa MelayuBn-lm-gCataletinaDanskEestiEsperantoEuskaraMagyarNorsk bokmlRomnSimple EnglishSloveninaSrpskiSrpskohrvatskiSuomiTrkeOzbekcha 50,000+ articles AsturianuAzrbaycancaBosanskiFryskGaeilgeGalegoHrvatskiKurdLatvieuLietuviNorsk nynorskShqipSlovenina Retrieved from " 2This article is about the year 455. For other uses, see 455 (disambiguation).This article needs additional citations for verification. Please help improve this article by adding citations to reliable sources. Unsourced material may be challenged and removed.Find sources:"455"news newspapers books scholar JSTOR (April 2019) (Learn how and when to remove this message)Calendar yearYearsMillennium1stmillenniumCenturies4thcentury5thcentury 6thcenturyDecades430s440s450s 460s470sYears452453454455 456457458vte455 by topicLeadersPolitical entitiesState leadersReligious leadersCategoriesBirthsDeathsDisestablishmentsvte455 in various calendarsGregorian calendar455CDLVAb urbe condita1208Assyrian calendar5205Balinese saka calendar376377Bengali calendar139 138Berber calendar1405Buddhist calendar999Burmese calendar183Byzantine calendar59635964Chinese calendar (WoodHorse)3152 or 2945to (WoodGoat)3153 or 2946Coptic calendar171172Discordian calendar1621Ethiopian calendar447448Hebrew calendar42154216Hindu calendars- Vikram Samvat511512- Shaka Samvat376377- Kali Yuga35553556Holocene calendar10455Iranian calendar167 BP 166 BPIslamic calendar172 BH 171 BHJavanese calendar340341Julian calendar455CDLVKorean calendar2788Minguo calendar1457 before ROC1457Nanakshahi calendar1013Seleucid era766/767 AGThai solar calendar997998Tibetan calendar(male Wood-Horse)581 or 200 or 572to(female Wood-Goat)582 or 201 or 571King Genseric sacks Rome (455)Year 455 (CDLV) was a common year starting on Saturday of the Julian calendar. At the time, it was known as the Year of the Consulship of Valentinianus and Anthemius (or, less frequently, year 1208 Ab urbe condita). The denomination 455 for this year has been used since the early medieval period, when the Anno Domini calendar era became the prevalent method in Europe for naming years.March 16 Emperor Valentinian III, age 35, is assassinated by two Hunnic retainers of the late Flavius Aetius, while training with the bow on the Campus Martius (Rome), ending the Theodosian dynasty. His primicerius sacri cubiculi, Heraclius, is also murdered.March 17 Petronius Maximus, former domesticus ("elite bodyguard") of Aetius, becomes (with support of the Roman Senate) emperor of the Western Roman Empire. He secures the throne by bribing officials of the imperial palace. Maximus consolidates his power by a forced marriage with Licinia Eudoxia, widow of Valentinian III.Maximus appoints Avitus, most trusted general, to the rank of magister militum and sends him on an embassy to Toulouse, to gain the support of the Visigoths. He elevates his son Palladius to Caesar and has him marry Eudocia, eldest daughter of Valentinian III.May 31 Maximus is stoned to death by an angry mob while fleeing Rome. A widespread panic occurs when many citizens hear the news that the Vandals are plundering the Italian mainland.June 2 Sack of Rome: King Genseric leads the Vandals into Rome, after he has promised Pope Leo I not to burn and plunder the city. Genseric sacks the city for a period of two weeks. Eudoxia and her daughters, Eudocia and Placidia, are taken hostage. The loot is sent to the harbour of Ostia and loaded into ships, from whence the Vandals depart and return to Carthage.July 9 Avitus is proclaimed Roman emperor at Toulouse, and later recognised by the Gallic chiefs in Viernum (near Arles).September 21 Avitus enters Rome with a Gallic army. He restores the imperial authority in Noricum (modern Austria) and leaves a Gothic force under Remistus, Visigoth general (magister militum), at Ravenna.The Ostrogoths conquer Pannonia and Dalmatia.Battle of Aylesford: Prince Vortimer rebels against the pro-Anglo-Saxon policies of his father, Vortigern. He is defeated in the battle at Aylesford (Kent). Hengist and his son Oisc become king of Kent. Horsa and Catigern, brother of Vortimer, are killed. The Britons withdraw to London (according to the Anglo-Saxon Chronicle).Skandagupta succeeds Kumaragupta I as ruler of the Gupta Empire (India). During his reign he crushes the Hun invasion; however, the expense of the wars drains the empire's resources and contributes to its decline.Gaero becomes king of the Korean kingdom of Baekje.[1]Earliest recorded date at Chichen Itza on the Yucatn Peninsula (Mexico) (approximate date).Barter economy replaces organized trade as Romans and other citizens desert their towns for the countryside, where they will be less vulnerable to barbarian raids (approximate date).The city of Vindobona (Vienna) is struck by an epidemic that spreads through the Roman provinces. The disease is probably streptococcus or a form of scarlet fever with streptococcus pneumoniae (approximate date).Rusticus, archbishop of Lyon (approximate date)Wang Baoming, empress of the Southern Qi (d. 512)March 16Valentinian III, emperor of the Western Roman Empire (b. 419)Heraclius, Roman courtier (primicerius sacri cubiculi)May 31 Petronius Maximus, emperor of the Western Roman EmpireBiyu of Baekje, king of Baekje[1]Catigern, prince and son of Vortigern (approximate date)Horsa, leader of the Anglo-Saxons (approximate date)Kumaragupta I, ruler of the Gupta Empire (India)Niall Noigiallach, High King of Ireland (approximate date)Palladius, son of Petronius Maximus (approximate date)Prosper of Aquitaine, disciple and Christian writer (approximate date)^ a b "List of Rulers of Korea". www.metmuseum.org. Retrieved April 20, 2019.Retrieved from " 3One hundred years, from 301 to 400Millennia1stmillenniumCenturies3rdcentury4thcentury5thcenturyTimelines3rdcentury4thcentury5thcenturyState leaders3rdcentury4thcentury5thcenturyDecades300s310s320s330s340s350s360s370s380s390sCategories:Births Deaths Establishments DisestablishmentsvteEastern Hemisphere at the beginning of the 4th century CE.Eastern Hemisphere at the end of the 4th century CE.The 4th century was the time period from 301 CE (represented by the Roman numerals CCCI) to 400 CE (CD) in accordance with the Julian calendar. In the West, the early part of the century was shaped by Constantine the Great, who became the first Roman emperor to adopt Christianity. Gaining sole reign of the empire, he is also noted for re-establishing a single imperial capital, choosing the site of ancient Byzantium in 330 (over the current capitals, which had effectively been changed by Diocletian's reforms to Milan in the West, and Nicomedeia in the East) to build the city soon called Nova Roma (New Rome); it was later renamed Constantinople in his honor.The last emperor to control both the eastern and western halves of the empire was Theodosius I. As the century progressed after his death, it became increasingly apparent that the empire had changed in many ways since the time of Augustus. The two-emperor system originally established by Diocletian in the previous century fell into regular practice, and the east continued to grow in importance as a centre of trade and imperial power, while Rome itself diminished greatly in importance due to its location far from potential trouble spots, like Central Europe and the East. Late in the century Christianity became the official state religion, and the empire's old pagan culture began to disappear.[citation needed] General prosperity was felt throughout this period, but recurring invasions by Germanic tribes plagued the empire from 376[1][2] CE onward. These early invasions marked the beginning of the end for the Western Roman Empire.In China, the Jin dynasty, which had united the nation prior in 280, began rapidly facing trouble by the start of the century due to political infighting, which led to the insurrections of the northern barbarian tribes (starting the Sixteen Kingdoms period), which quickly overwhelmed the empire, forcing the Jin court to retreat and entrench itself in the south past the Yangtze river, starting what is known as the Eastern Jin dynasty around 317. Towards the end of the century, Emperor of the Former Qin, Fu Jin, united the north under his banner, and planned to conquer the Jin dynasty in the south, so as to finally reunite the land, but was decisively defeated at the Battle of Fei River in 383, causing massive unrest and civil war in his empire, thereby leading to the fall of the Former Qin, and the continued existence of the Eastern Jin dynasty.According to archaeologists, sufficient archaeological evidence correlates of state-level societies coalesced in the 4th century to show the existence in Korea of the Three Kingdoms (300/400668 CE) of Baekje, Goguryeo, and Silla.Historians of the Roman Empire refer to the "Long Fourth Century" to the period spanning the fourth century proper but starting earlier with the accession of the Emperor Diocletian in 284 and ending later with the death of Honorius in 423 or of Theodosius II in 450.[3]See also: Christianity in the 4th centuryGregory the Illuminator mosaic, converted Armenia from Zoroastrianism to ChristianityContemporary bronze head of Constantine I (r. 306337 AD)Early 4th century Former audience hall now known as the Basilica, Trier, Germany, is built.Early 4th century The Gupta Empire is established.301: Armenia first to adopt Christianity as state religion.304439: The Sixteen Kingdoms in China begins.306337: Constantine the Great, ends persecution of Christians in the Roman Empire (see also Constantinian shift) and Constantinople becomes new seat of government (New Rome).Tikal had a population of about 100,000 when it was conquered by Teotihuacan, less than a fourth of its peak population[4]320: Butuan Boat One, the oldest known Balangay, a multi-purpose ship native to the Philippines is built.325328: The Kingdom of Aksum adopts Christianity.325: Constantine the Great calls the First Council of Nicaea to pacify Christianity in the grip of the Arian controversy.335380: Samudragupta expands the Gupta Empire.337: Constantine the Great is baptized a Christian on his death bed.350: About this time the Kingdom of Aksum conquers the Kingdom of Kush.350400: At some time during this period, the Huns began to attack the Sassanid Empire.[2]350: The Kutai Martadipura kingdom in eastern Borneo produced the earliest known stone inscriptions in Indonesia known as the Mulavarman inscription written in the Sanskrit language using Pallava scripture.[5]Mid-4th century Dish, from Mildenhall, England, is made. It is now kept at the British Museum, London.Mid-4th century Wang Xizhi makes a portion of a letter from the Feng Ju album. Six Dynasties period. It is now kept at National Palace Museum, Taipei, Taiwan, Republic of China.365: An earthquake with a magnitude of at least eight strikes the Eastern Mediterranean. The following tsunami causes widespread destruction in Crete, Greece, Libya, Egypt, Cyprus, and Sicily.376: Visigoths appear on the Danube and are allowed entry into the Roman Empire in their flight from the Huns.378: Battle of Adrianople: Roman army is defeated by the Visigoth cavalry. Emperor Valens is killed.378395: Theodosius I, Roman emperor, bans pagan worship, Christianity is made the official religion of the Empire.378: Siyaj K'ak' conquers Waka on (January 8), Tikal (January 16) and Uaxactun.Wall painting of the Council of Constantinople (381) in the Stavropoleos monastery, Romania381: First Council of Constantinople reaffirms the Christian doctrine of the Trinity by adding to the creed of Nicaea.383: Battle of Fei River in China.395: The Battle of Canhe Slope occurs.395: Roman emperor Theodosius I dies, causing the Roman Empire to split permanently.Late 4th century: Cubiculum of Leonis, Catacomb of Commodilla, near Rome, is made.Late 4th century: Atrium added in the Old St. Peter's Basilica, Rome.For a more comprehensive list, see Timeline of historic inventions 4th century.The Stirrup was invented in China, no later than 322.[6][1]Kama Sutra, dated between c.400 BC to c. 300 AD.[7][8]Iron pillar of Delhi, India is the world's first Iron Pillar.[citation needed]Trigonometric functions: The trigonometric functions sine and versine originated in Indian astronomy.[9]Codex Sinaiticus and the Codex Vaticanus Graecus 1209, are the earliest Christian bibles.[10][11]Book of Steps, Syriac religious discourses.[citation needed]^ a b "The invention and influences of stirrup". 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Retrieved 16 March 2013.Retrieved from " 4The following pages link to 4th century External tools(link counttransclusion countsorted list) See help page for transcluding these entriesShowing 50 items.View (previous 50 | next 50) (20 | 50 | 100 | 250 | 500)List of decades, centuries, and millennia (links | edit)Religion in pre-Islamic Arabia (links | edit)Rosetta Stone (links | edit)20th century (links | edit)15th century (links | edit)16th century (links | edit)17th century (links | edit)18th century (links | edit)14th century (links | edit)1st century (links | edit)13th century (links | edit)397 (links | edit)12th century (links | edit)11th century (links | edit)7th century (links | edit)10th century (links | edit)9th century (links | edit)8th century (links | edit)6th century (links | edit)5th century (links | edit)3rd century (links | edit)2nd century (links | edit)405 (links | edit)4th century BC (links | edit)432 (links | edit)200s (decade) (links | edit)300s (decade) (links | edit)1st century BC (links | edit)2nd century BC (links | edit)3rd century BC (links | edit)5th century BC (links | edit)6th century BC (links | edit)400s (decade) (links | edit)310s (links | edit)320s (links | edit)321 (links | edit)21st century BC (links | edit)11th century BC (links | edit)286 (links | edit)476 (links | edit)385 (links | edit)7th century BC (links | edit)410 (links | edit)325 (links | edit)380s (links | edit)381 (links | edit)470s (links | edit)430s (links | edit)430 (links | edit)510s (links | edit)View (previous 50 | next 50) (20 | 50 | 100 | 250 | 500)Retrieved from " WhatLinksHere/4th_century" When studying geometry, one of the basic shapes youll encounter is the parallelogram. This unique quadrilateral has specific characteristics that make it essential in mathematics. Lets dive in to understand what is a parallelogram, its properties, and the key formulas you need to know to easily solve problems involving parallelograms.What is a Parallelogram and How to Recognize It?A parallelogram is a quadrilateral in which opposite sides are both parallel and equal in length. To make this clearer, imagine a quadrilateral ABCD. If sides AB and CD are parallel to each other, and likewise sides BC and AD are parallel, this shape is definitely a parallelogram.Another important feature of a parallelogram is that opposite angles are equal. Moreover, if you add two adjacent angles, youll always get 180. This is crucial for solving many problems!There are also special types of parallelograms:Rectangle: A parallelogram with all right angles.Rhombus: A parallelogram with all sides equal in length.Square: A parallelogram where all sides are equal and all angles are right angles.Now, lets talk a bit about the height of a parallelogram. The height is the perpendicular segment from a vertex to the opposite side (or its extension). For example, in parallelogram ABCD, the heights could be segments EF, BG, CH, BI, AJ, as shown in the diagram.Here, heights EF, BG, CH are drawn to sides BC and AD, while heights BI, AJ are perpendicular to sides AB and CD, respectively.Key Properties of a Parallelogram: What Makes It Special?A parallelogram has some fascinating properties. Lets explore these essential properties together!Opposite Sides of a Parallelogram Are EqualLets examine parallelogram ABCD and draw diagonal AC. This creates two triangles, ABC and CDA.In this case:Side AC is common to both triangles.Angles BAC=DCA (because they are alternate interior angles when parallel lines AB and DC are intersected by transversal AC).Angles BCA=DAC for the same reason (with parallel lines AD and BC).The triangles are congruent by the AA criterion (two angles and the side between them). Therefore, their corresponding sides must be equal: AB=CD and BC=AD. Thus, we have proven the first property!Opposite Angles of a Parallelogram Are EqualLets take parallelogram ABCD again with diagonal AC. As we have already established, ABC=CDA. This means the corresponding angles of these triangles are equal: So, this property is also proven!Diagonals of a Parallelogram Bisect Each OtherLets draw diagonals AC and BD, which intersect at point O.In the triangles AOD and BOC:OAD=OCB (alternate interior angles with parallel lines AD and BC and transversal AC).ADO=CBO (alternate interior angles with parallel lines AD and BC and transversal BD).AD=BC (opposite sides of the parallelogram).Since the triangles are congruent, we conclude that AO=OC and BO=OD. Therefore, the diagonals bisect each other at the intersection point O.What is a Parallelogram Without Formulas? Need Diagonals, Perimeter, and Area? Check This Table!To easily solve geometry problems, its important to know the basic formulas for a parallelogram. For your convenience, heres a table summarizing the key formulas:TermDefinitionFormulaDiagonals of a parallelogramA segment connecting two opposite verticePerimeter of a parallelogramThe space enclosed by the sides, calculated by multiplying any side by its corresponding heightArea of a parallelogramSpace enclosed by sides; calculated by multiplying base by heightWhere:a and b are the lengths of adjacent sides of the parallelogram. is the angle between sides a and b.ha and hb are the heights corresponding to sides a and b.Practical Exercises: Testing and Reinforcing Your Knowledge of ParallelogramsNow that you know all the key information about parallelograms, its time to practice! Below are a few interesting exercises that will help you apply what youve learned and solidify your understanding. Lets go ahead and practice together!Example 1: What is a Parallelogram in Geometry?A parallelogram is a special type of quadrilateral. Its opposite sides are both parallel and equal in length. Additionally, its opposite angles are also equal.Example 2: Is a Parallelogram a Regular Polygon?A regular polygon is one where all sides and angles are equal. In a parallelogram, only opposite sides and angles are equal, not all of them. So, a parallelogram is not a regular polygon.Example 3: In Parallelogram ABCD, Angle A is 90 Degrees. Prove All Angles are Right AnglesWe already know that opposite angles of a parallelogram are equal. If A=90, then the opposite angle C must also be 90. Also, the sum of adjacent angles in a parallelogram is 180. So, if A=90, then the adjacent angle D must be 180-90=90. Similarly, the opposite angle B will also be 90. Thus, all angles in parallelogram ABCD are right angles.Example 4: The Bisector of an Obtuse Angle in a Parallelogram Divides One Side in a 2:1 Ratio. Find the Sides of the Parallelogram if Its Perimeter is 60 cmLet the bisector of angle B intersect side AD at point M, and according to the problem, AM:MD=2:1. The bisector divides the angle into two equal parts, making triangle ABM isosceles. Therefore, AB=AM. Denote the smaller segment MD as x, then AM = 2x, and AD=AM+MD=3x. Using the formula for the perimeter of the parallelogram: P=2(AB+AD), we substitute the known perimeter of 60 cm and solve for x:Thus, AB=12 cm and AD=18 cm.Diagonals, Perimeter, Area Where to Find More Explanations and Examples?Want more details and examples? Here are a few useful links to help expand your understanding of the main formulas and properties of parallelograms. In each of these topics, youll find detailed explanations and visual examples that will make the learning process even more engaging.Diagonals of a Parallelogram Learn how to calculate the diagonals of a parallelogram and how to apply this knowledge in solving various problems.Perimeter of a Parallelogram Understand how to find the perimeter of a parallelogram, and learn why this is important for solving different geometry problems.Area of a Parallelogram Get to know the formulas to find the area of a parallelogram, and try applying them in real examples to reinforce your learning.Programming the Shape: Is It Really a Parallelogram?Combining geometry and programming opens up exciting opportunities for learning and practical experimentation. Imagine how fun it would be to write a simple application that determines whether a given quadrilateral is a parallelogram. Below is a flowchart that can help you design the logic of the program: simply check if each diagonal is bisected at the intersection point, and if so, the program will return a clear answer: Yes, its a parallelogram or No, its not a parallelogram.This approach will be a great exercise for applying both geometry knowledge and basic algorithmic structures, showing how theory can turn into a useful tool in real time.

A quadrilateral is always a parallelogram. true false. Why parallelogram is quadrilateral. Is a parallelogram always a square.