Proving the parallelogram side theorem edgenuity answers

In today's geometry lesson, you will learn the 6 ways to prove a parallelogram. Jenn, Founder Calcworkshop®, 15+ years of experience (student and certificate) More specifically, how does a quadrilateral feel is a parallelgram? Finally, you will learn how to complete its 2 columns-protections. Let's go in! 6 Properties of Parallelograms Well, we must show one of the six basic properties of the parallelograms to be true! Both pairs of opposite sides are parallel Both pairs of opposite sides are congruent Both pairs of opposite angles are congruent Diagonalie bisect l'another One angle is complementary to both consecutive corners (internal of the same side) A couple of opposite sides are congruent and parallel So we will put our thinking caps and use our detective skills, as we have established to demonstrate (show) that a quadrilateral is a parallelgram. This means that we are looking for whether both pairs of opposite sides of a quadrilateral are congruent. Because if I am, then the figure is a parallel. In addition, we can determine that both pairs of opposite sides are parallel, and once again, we have shown that the quadrilateral is a parallelgram. Another approach could lead to the opposite angles of a quadrilateral being congruent or that the consecutive corners of a quadrilateral are complementary. Both of these facts allow us to demonstrate that the figure is actually a parallelgram. A couple of opposite sides are both parallel and congruent consecutive angles in a parallelgram are complementary We may find that the information provided will indicate that the diagonals of the bisect quadrilateral to each other. If so, then the figure is a parallelgram. Diagonals of a Bisect Parallelgram Each other One tip of Math Bits says, if we can show that a set of opposite sides are both parallel and congruent,in turn indicates that the polygon is aThis will save time when you work a test. In the video below: We will use the properties of the parallelograms to determine if we have enough information to prove that a quadrilateral data is a parallelgram. Find the missing values of a certain parallelgram. Write different tests to two columns (step by step). Proving Parallelograms – Lesson & Examples (Video) 26 min 00:09:14 – Decide if you are given enough information to prove that the quadrilateral is a parallelgram. (Example No. 7-13) 00:15:24 – Find the x value in the parallelgram. (Examples #14-15) 00:18:36 – Complete the test with two columns. (Examples #16-17) Practice problems with step-by-step solutions Chapter test with video solutions Get access to all courses and over 150 HD videos with your monthly subscription, mid-year, and annual plans available get my subscription now Is not yet ready to enroll? Take Calcworkshop for a ride with our FREE Limits Course Properties of a Parallelgram help us identify a Parallelgram by a given set of figures easily and quickly. Before we know the properties of a parallelogram, let us know before the parallelogram. It is a four-sided closed figure with opposite sides are equal and opposite corners are equal. The properties of a parallelgram mainly deal with its sides and corners. We all know that a parallelogram is a convex polygon with 4 edges and 4 vertices. The opposite sides are equal and parallel; even opposite corners are equal. Let's learn more about the properties of the detailed parallelgrams in this lesson. A parallelogram is a type of quadrilateral in which opposite sides are parallel and equal. There are four corners of a parallelgram at the top. Understanding the properties of the parallelograms helps to easily connect the angles and sides of a parallelgram. In addition, properties are usefulcalculations in problems related to sides and angles of a parallelgram. the four important properties of a parallelogram are the following. below.the sides of a parallelogram are equal and parallel to each other. The opposite corners are the same. eA= eC and eB = eD All corners of a parallelogram add up to 360o. .A + .B + .C + .D = 360o. The consecutive angles of a parallelgram are additional .A + .B = 180o .B + .C = 180o .C + .D = 180o .D + .A = 180o First, we will remember the meaning of a diagonal. The diagonals are line segments that join opposite vertices. In parallelgram PQRS, PR and QS are diagonals. The diagonal properties of a parallelogram are as follows: The diagonals of a parallelogram whisper to each other. OQ =OS and OR = OP Each diagonal divides the parallelogram into two congruent triangles, then, ΔRSP ΔPQR and ΔQPS . ΔSRQ. Parallelogram Law: The sum of squares on the sides is equal to the sum of squares of the diagonals. PQ2+QR2+RS2+SP2=QS2+PR2 Theorems on the properties of a parallelgram are useful to define the rules for working through the problems on the parallelgrams. The properties of the sides and corners of a parallelogram can be easily understood and applied to solve various problems. In addition, these theorems are also supportive to understand concepts in other quadrilaterals. Below are four important theorems related to the properties of a parallelgram: The opposite sides of a parallelgram are opposite angles of a parallelgram equal diagonals of a bisect parallelgram each other A pair of opposite sides is equal and parallel in a parallel theorem 1: in a parallelgram the opposite sides are equal. This means, in a parallelgram, that opposite sides are equal. ABCD is a parallelogram. To test: The opposite sides are equal, AB=CD, and BC=AD. Try: In parallel ABCB, compare ABC and CDA triangles. In these triangles AC = CA (common ones). Also).BAC =).DCA (altered inner angle), and).BCA =).DAC (altered inner angle). From herecriterion, both triangles are congruent and the corresponding sides are equal. Therefore we have AB = CD, and BC = AD. Converse of Theorem 1: If the opposite sides in a quadrilateral are equal, then it is a parallelogram. If AB = CD and BC = AD in the quadrilateral ABCD given, then it is a parallelgram. Date: The opposite sides in a quadrilateral ABCD are equal, AB = CD, and BC = AD. A Prove: ABCD is a parallelgram. Try: In the ABCD quadrilateral we are given that AB = CD, and AD = BC. Now compare the two ABC and CDA triangles. Here we have AC = AC (Common Sides,) AB = CD (from which alternative internal corners are equal) and AD = BC (given.) So, with the SSS criterion both triangles are congruent, and the corresponding angles are equal. Then we can conclude that .BAC = ,DCA, and .BCA = .DAC. Therefore AB // CD, BC // AD, and ABCD is a parallelgram. Theorem 2: In a parallelgram, opposite angles are equal. Given: ABCD is a parallelogram, and .A, .B, .C .D are the four corners. To try: .A =.C and .B=.D Test: Suppose ABCD is a parallelgram. Now compare the ABC and CDA triangles. Here we have AC=AC (common sides), '1='4 (altered inner angle,) and '2='3 (altered inner angle). Thus, the two triangles are congruent, which means that .B=.D. Similarly, we can show that .A=.C. This shows that opposite angles in any parallelgram are equal. Converse of Theorem 2: If the opposite angles in a quadrilateral are equal, then it is a parallelgram. Date: .A=.C and .B=.D in the quadrilateral ABCD. A Prove: ABCD is a parallelogram. Try: Take that .A = .C and .B = .D in the ABCD parallelgram given above. We have to prove that ABCD is a parallelogram. We have: .A + .B + .C + .D = 360o;2(.A + .B) = 360o; .A + .B = 180o. This must mean that AD / BC. Similarly, we can show AB//CD. So, AD/BC andABCD is a parallelogram. Theorem 3: Diagonal of a bisect every other parallel. This means, in a parallelogram, that the diagonals are whispering to each other. Data: PQTR is a parallelogram. PT and QR are the diagonals of the parallelogram. For Prove: the PT and RQ diagonals are bidding each other. PE=ET and ER=EQ Proof: First, we assume that PQTR is a parallelgram. Compare RET triangles and PEQ triangle. We have PQ = RT (the opposite sides of the parallelgram), delQRT =).PQR (altered inner angle), and).PTR =).QPT (altered inner angle). With the ASA criterion, the two triangles are congruent, which means that PE = ET and RE = EQ. Thus, the two diagonals PT, and RQ are bisexual to each other, and PE=ET and ER=EQ The Converse of Theorem 3: If the diagonals in a bisect quadrilateral the other, then it is a parallelgram. In the quadrilateral PQTR, if PE=ET and ER=EQ, then it is a parallelgram. Date: The PT and QR diagonals whisper to each other. For Prove: PQRT is a parallelgram. Try: Let's assume that the PT and QR diagonals are whispering to each other. Compare the RET triangle, and PEQ triangle once again. We have: RE = EQ, ET = PE (Diagonals are bisecano each other), 'RET =).PEQ (front corner). So, according to the SAS criterion, the two triangles are congruent. This means that .QRT = ,PQR, and .PRT = .QPT . So PQRT is a parallelgram. Theorem 4: A pair of opposite sides is equal and parallel in a parallelgram. Date: It is because AB=CD \(\) and AB ||| CD . A Prove: ABCD is a parallelogram. Try: We compare the AEB triangle and the DEC triangle. We have AB = CD, sti1 = '3 (altered internal angle), and '2 =).4 (altered inner angle). So, the two triangles are congruent. So we can conclude that AE=EC, BE=ED. Therefore, the AC and BD diagonals are whispering to each other, and this means further that ABCD is a parallelgram. Important Notes 1. A quadrilateral isParallelgram when: the opposite sides of a quadrilateral are equal opposite corners of a quadrilateral are equal the diagonals of a quadrilateral bisect the other pair of opposite sides is equal and parallel 2. Note that the relationship between two lines intersected by a transversal, when the angles on the same side of the transversal are complementary, are parallel to each other. You know? Why is a kite not a parallelogram? Is a trapezoid isoscele a parallelgram? The 7 properties of a parallelogram are as follows: The opposite sides of a parallelogram are equal. The opposite corners of a parallelgram are equal. The consecutive angle of a parallelgram is additional. If a corner is a right angle, all angles are right angles in a parallelgram. The diagonals of a parallelogram whisper to each other. Each diagonal of a parallelgram the bisects in two congruent triangles. If a pair of opposite sides of a quadrilateral is equal and parallel, then the quadrilateral is a parallelgram. What are the properties of the diagonals of a parallelogram? There are two important properties of the diagonals of a parallelogram. The diagonal of a parallelogram divides the parallelogram into two congruent triangles. And the diagonals of a parallelogram whisper to each other. Are the diagonals of a parallelogram equal? The diagonals of a parallelogram are equal. The opposite sides and opposite corners of a parallelogram are equal. And these opposite sides and corners make up for two congruent triangles, with the two diagonals that are the sides of these two congruent triangles. Then the diagonals of the parallelgram are equal. What is a Parallelogram? A parallelogram is a quadrilateral with opposite sides equal and parallel. The opposite angle of a parallelogram is also equal. In short, a parallelogram can be considered as a twisted rectangle. It is more than a rectangle, but the corners at the top are not cornerWhat are the examples of a Parallelogram? Theand a rectangle are the two simple examples of a parallelogram. Then the flat surfaces of the furniture like a table, a cot, a normal sheet of A4 paper can all be counted as an example of a parallelgram. What are the Four Important Properties of a Parallelogram? The four important properties of a parallelogram are the following. The opposite sides are the same. The opposite corners are the same. The diagonals are the same. The opposite corners are the same. Can a rectangle be called a parallelogram? A rectangle meets all the properties of a parallelogram. The opposite sides of a rectangle are equal and each corner of a rectangle is a right angle. So with these features, a rectangle satisfies all the properties of a parallelgram and can be called a parallelgram. What is the difference between a parallelgram and a Quadrilateral? A parallelgram can be called quadrilateral. Each parallelgram can be called quadrilateral, but each quadrilateral can not be called parallelgram. A trapeze, rhombus, can be called quadrilateral, but does not fully satisfy the properties of a parallelogram and therefore cannot be called a parallelgram. A square and a rectangle can be called a parallelogram. Parallels are everywhere. They hide at sight, they stare at us right in the face. As napkins and napkins, we use them every day and we never give them much thought. Right now, as you read this, you're looking at a parallelogram. Yes, exactly. The computer screen is a parallelgram. Unless you have a particularly vigorous look. A parallelogram is any quadrilateral with two sets of parallel sides. When we think of the parallels, we usually think of something like that. Unless he did serious damage to the computer screen, it probably doesn't look like that. For the sake of your bank account, we hopeThat doesn't sound like that. It should be rectangular. So, what's he giving? Well, a rectangle has two sets of parallel sides, right? So...as much as a parallelogram as the one above. In fact, squares, rectangles and rectangles are all special cases of parallels. Don't worry about your pretty head of those specific parallels. We'll cover them later. Since parallels are common as a brain freeze in a gelateria, we descend and expose with them. Just not in the ice cream shop. It's just unhealthy. Since a parallelogram is a specific type of quadrilateral, it is supplied with all the good that quadrilaterals have, as 360° of internal angles, opposite angles, sides and vertices, and two honorable and generous diagonals. Yeah, we just referred to the diagonals like "onerable and generous," and it's not because they donate to charity or volunteer in the canteen. It's because the diagonals of a parallelogram split it into two congruent triangles. Don't you believe it? We can prove it. Can you? As ABCD is a parallelgram, show that ΔABC and ΔCDA are congruent. StatementsReasons1. ABCD is a Given2 parallelgram. AB | CD e BC ||| DADefinition of a Parallelogram (1)3. .BAC . ,DCA, ,BCA | .DACAlternate theoretical angles (3)4. AC . ACReflexive property5. ΔABC Δ ΔCDAASA Postulate (3, 4)Bam! Congruent triangles. We don't want to say that we told you that, so we'll opt for "We've informed you this way. But you know what's even better? Thanks to CPCTC (Congruent triangle parts are congruent), we can demonstrate three more theorems immediately: Both pairs of opposite sides of a parallelgram are congruent. So for ABCD, AB di CD and BC . DA. Both pairs of opposite angles are congruent So for ABCD, .B .D and .A . C. Two consecutive corners are complementary. So .A and .B are additional, as are .C and .D. With all these theorems about the parallels, it is as we hit mathematical gold. But wait, there's more! Order in the next ten minutes and we will throw another theorem, absolutely free!pay $4.95 for shipping and shipping. Or, if you prefer not, you can get the theorem for free! Think about it. Campionary ProblemDate that ABCD is a parallelgram, proves that its diagonals, AC and BD, will whisper to each other. StatementsReasons1. ABCD is a Given2 parallelgram. .BAE .DCE e .ABE . .CDEAlternate theorem of internal angles (1)3. AB . The opposite sides of a parallelogram are congruent (1)4. ΔABE Δ ΔCDEASA Postulate (2, 3)5. AE CE and BE . DECPCTC (4)6. And it is the central point of AC and BDDefinition of the midpoint (5)7. AC and BD enact each otherSection Definition bisector (6)The key to this test (and probably most quadrilateral tests) is a theorem about triangles. You thought they were over, didn't you? Well, let's hate to blow your bubble, man, but we learned to know those triangles for a reason. And it wasn't just to make your math teacher happy. We have established five different theorems on the parallelgrams. So it's reasonable that we ask our favorite questions about mathematics. "Why do we care?" "What does this matter?" "How is all this relevant to my life?" "Why are these little golden pepite of wisdom important? "Well, we could continue to collect these pepite and eventually give Fort Knox a race for his money. On the opposite side, we would have heard a lot of useless facts when we could use them as a primer of parallelgram. Let's say he accused a quadrilateral of being a parallelogram. Now you have to declare your case. Here are some ways to convince the jury that the quadrilateral is guilty of being a parallelogram: The two pairs of opposite sides are parallel. (This is the definition of a parallelgram.) Both pairs of opposite sides are congruent. A couple of opposite sides is both congruent and parallel. Both pairs of opposite corners are congruent. The diagonals whisper to each other. ManyI would like to ask the Commissioner whether he is a member of the committee. First, we took a figure. No.a parallelgram, and we showed that the figure had some special properties. Now, we're saying that if the figure has these properties, it must be a parallelogram. Apart from the definition, we must show that each of these statements is true. Fortunately, we just have to apply the facts we already know. ProblemGiven Champion: Quadrilateral ABCD has two pairs of opposite sides that are congruent. Test: ABCD is a parallelgram. StatementsReasons1 AB . CD and BC . DAGiven2. Diagonal AC creates ΔABC and ΔCDADefinition of a triangle3. AC . ACReflexive property4. ΔABC Δ ΔCDASSS Postulated (1, 2, 3)5. .BAC eDCA and .CAD . ACACBCPCTC (4)6. AB | CD and BC | DAConverse internal angles alternative theorem (5)7. ABCD is a parallelgramDefinition of a Parallelgram (6) We can demonstrate the rest of the theorems in similar ways, but we are not going now. We'll leave that fun for later. Let's throw numbers in the mix. Sample problem What are the lengths of FJ and JH in parallelgram FGHJ? Since the opposite sides of a parallelgram are congruent, we know that FJ . GH and that GH = 3. It also means FJ = 3. The same goes for JH, only with FG, which has a length of 5. So JH = 5 pure. Good.