Centroid coordinates of a right triangle

The median triangle is a line segment between the vertex of the triangle and the center of the opposite side. Each median divides the triangle into two triangles of the same area. Centroid is the intersection of the three medians. The three medians also divide the triangle into six triangles, each with the same area. The centroid divides each median into two parts, which are always in a ratio of 2:1. Centroid also has a property that AB2 + BC2 + CA2 = 3 (GA2 + GB2 + GC2). AB^2+BC^2+CA^2=3\big(GA^2+GB^2+GC^2\big). AB2+BC2+CA2=3(GA2+GB2+GC2). This is due to the more general which PA2+PB2+PC2=GA2+GB2+GC2+3PG2PA^2+PB^2+PC^2=GA^2+GB^2+GC^2+3PG^2PA2+PB2+PC2=GA2+GB2+GC2+3PG2 for any P.P.P. Let DDD be where AGAGAG and BCBC meet, EEE the place where BGBGBG and CACACA meet, and FFF the place where CGCGCG and ABABAB meet. Use the formula on △ADP, △BEP, △CFP\triangle ADP,~\triangle BEP,~\triangle CFP△ADP, △BEP, △CFP and add them together: PA2+PB2+PC2+2(PD2+PE2+PF2)=3(3PG2+GA2+GB2+GC22). (1) PA^2+PB^2+PC^2+2(PD^2+PE^2+PF^2)=3\left(3PG^2+\DFRAC^2+GB^2+2 +GC ^2}{2}\right).\qquad (1)PA2+PB2+PC2+2(PD2+PE2+PF2)=3(3PG2+2GA2+GB2+GC2). (1) Apply the formula to △ABP, △BCP, △CAP\triangle ABP,~\triangle BCP,~\triangle CAP△ABP, △BCP, △CAP and add them together: 2(PA2+PB2+PC2)=2(PD2+PE2+PF2+AB2+CA24). (2)2(PA^2+PB^2+PC^2)=2\left(PD^2+PE^2+PF^2+\DFRAC^2+2+BC^2+2+2+2+2+2+2 CA^2}{4}\right).\qquad (2)2(PA2+PB2+PC2)=2(PD2+PE2+PF2+4AB2+BC2+CA2). (2) Apply the formula to △ABD, △BCE, △CAF\triangle ABD,~\triangle BCE,~\triangle CAF△BD, △BCE, △CAF and add them up: AB2+BC2+CA2=3(GA2+GB2+GC2). {\color{#D61F06}{AB^2+BC^2+CA^2=3(GA^2+GB^2+GC^2)}}.\qquad (3)AB2+BC2+CA2=3(GA2+GB2+GC2). (3) (\big((Note that we accidentally proved AB2 + BC2 + CA2 = 3 (GA2 + GB2 + GC2) AB ^ 2 + BC ^ 2 + CA ^ 2 = 3 (GA ^ 2 + GB ^ 2 + GC ^ 2) AB2 + BC2 + CA 2 = 3 (GA2 + GB2 + GC2) in the way.) \big)) Substitute (3)(3)(3) to (2)(2)(2) and move some things around: 2(PA2+PB2+PC2)−2(PD2+PE2+PF2)=32(GA2+GB2+GC2).2(PA^2+PB^2+2+2 PC^2)-2(PD^2+PE^2+PF^2)=\dfrac{3}{2}(GA^2+GB^2+GC^2).2(PA2+PB2+PC2)−2(PD2+PE2+PF2)=23 (GA2+GB2+GC2). Add the above equation with (1):(1):(1): 3(PA2+PB2+PC2)=3(GA2+GB2+GC2+3PG2)PA2+PB2+PC2=GA2+GB2+GC2+3PG2. □\begin{aligned} 3(PA^2+PB^2+PC^2)&3(GA^2+GB^2+GC^2+3PG^2) \\ PA^2+PB^2+PC^2&2& GA^2+GB^2+22+GC^2+3PG^2.\ _\square \end{aligned}3(PA2+PB2+PC2)PA2+PB2+PC2 =3(GA2+GB2+GC2+3PG2)=GA2+GB2+GC2+3PG2. □ (\big((The formula AB2+BC2+CA2=3(GA2+GB2+GC2)AB^2+BC^2+CA^2=3(GA^2+GB^2+2+GC^2)AB2+BC2+CA2=3(GA2+GB2+GC2) can also be obtained from the takeover of P=A,B,CP=A, B, CP =A,B,C in order, and then adding three results.) \big)) A similar property is as follows: if any row over the centroid encounters ABABAB at point DDD and ACACAC at EEE point, then BDDA + CEEA = 1.\frac{BD}{DA}+\frac{CE}{EA}=1.DABD +EACE =1. It is appropriate that it is possible to calculate the median length from lateral lengths: AD=2b2+2c2−a24BE=2a2+2c2−b24CF=2a2+2b2−c24.\begin{aligned} AD &= \sqrt{\frac{2b^2+2c^2 -a^2}{4}}\\ BE &= \sqrt{\frac{2a^2+2c^2-b^2}{4}}\\ CF &= \sqrt{\frac{2a^2b^2-c^2}{4}}. \end{aligned}ADBECF =42b2+2c2−a2 =42a2+2c2−b2 =42a2+2b2−c2 . Note that this also indicates the lengths of AG, BG, AG, BG, AG, BG, cgcgcg, because the median is divided in a ratio of 2:1 by centroid: AG=1 2 b2+2c2−a23BG=2a2+2c2−b23CG=2a2+2b2−c23,\begin{aligned} AG &= \frac{\sqrt{2b^2+2c ^2-a^2}}{3}2 <2> <1>\\\\ BG &= \frac{\sqrt{2a^2+2c^2-b^2}}{3} \\\\ CG &= \frac{\sqrt{2a^2b^2-c^2}}{3} , \end{aligned}AGBGCG =32b2+2c2−a2 =32a2+2c2−b2 =32a2+2b2−c2 , which is another way how to show that AB2+BC2+CA2=3 (GA2+GB2+GC2)AB^2+BC^2+CA^2=3\big(GA^2+GB^2+GC^2\BIG)AB2+BC2+CA2=3(GA2+GB2+GC2). As a result of the EU General Data Protection Regulation (GDPR). Currently, we do not allow internet traffic on Byju's website from european union countries. No performance tracking or measurement cookies have been served on this page. Average (average) position of all points in the image This article lists generic references, but remains largely unverified because it lacks sufficient corresponding inline citations. Please help improve this article by introducing more accurate quotes. (April 2013) (Learn how and when to remove this template message) The centroid of the triangle In mathematics and physics, the center or geometric center of the plane is the arithmetic mean position of all points in the figure. Informally, this is the point at which the cutout of the shape could be perfectly balanced at the tip of the pin. [1] The definition applies to any object in n-dimensional space: its center is the mean position of all points in all coordinate directions. [2] While in geometry the word baricenter is synonymous with centroid, in astrophysics and astronomy baricenters are the center of the mass of two or more bodies orbiting each other. In physics, the material centre is the arithmetic mean of all points weighted by local density or specific mass. If a physical object has a uniform density, its mass center is the same as the center of its shape. In geography, the geographical centre of the region is the focal point of the radial projection of the area of the Earth's surface to sea level. History The term centroid is from the recent minting of coins (1814). [quote required] It is used as a substitute for older terms of centre of gravity and centre of gravity, where purely geometric aspects of this point need to be emphasised. The term is typical for the English language. The French use the centre de gravité in most cases, and others use terms of similar importance. The centre of gravity, as the name suggests, is the idea that originated in mechanics, most in connection with construction activities. When, where, and by whom it was invented is not known, because it is a concept that probably occurred to many people individually with minor differences. While it is possible that Euclid was still active in Alexandria as a child of Archimed (287–212 BC), it is certain that when Archimed visited Alexandria, Euclid was no longer there. Archimédes could not therefore learn the theorize that the centers of the triangle meet at a point – the center of gravity of the triangle directly from Euclid, because this design is not in Euclid's elements. The first explicit statement of this proposal is due to Heron Alexandria (possibly the first century CE) and occurs in its mechanics. It is possible to add, by the way, that the design did not become common in textbooks on plane geometry until the nineteenth century. While Archimédes does not explicitly mention this proposal, it is indirectly referred to, suggesting that he knew it. Jean Etienne Montucla (1725–1799), author of the first history of mathematics (1758), categorically declares (vol. I, p. 463) that the centre of gravity of solids is an object not touched by archimédes. In 1802 Charles Bossut (1730–1813) published a two-part Essai sur l'histoire générale des mathématiques. This book was highly appreciated by his contemporaries, judging by the fact that within two years of its publication it was already available in translation in Italian (1802-03), English (1803) and German (1804). Bossut credits Archimed for finding the center of the planes, but he has nothing to say about solids. [3] The geometric centroid properties of a convex object always lie in the object. An unconventional object may have a centroid that is outside the image itself. For example, the center of a ring or bowl lies in the central emptiness of an object. If centroid is defined, it is the fixed point of all isometry in the symmetry group. In particular, the geometric centroid of an object lies at the intersection of all its hypersymmetry. The centroid of many figures (regular polygon, common polyhedron, cylinder, rectangle, rhombus, circle, sphere, ellipse, ellipsoid, supertele, supertesoid, etc.) can be determined only by this principle. In particular, the centroid of the parallel is the meeting place of its two diagonals. This does not apply to other quadrangles. For the same reason, the centroid of an object with translational symmetry is undefined (or lies outside bounding space) because the translation has no fixed point. Examples The center triangle is the intersection of the three medians of the triangle (each median connecting the vertex to the center of the opposite side). [4] See below for more features of the triangle centroid. Centroid lead localization method evenly Planar laminate, for example, in the picture and below, can be determined experimentally using a plume and pin to find the collated center of gravity of a thin body with a uniform density that has the same shape. The body is held by a pin, inserted at a point outside the supposed centroid in such a way that it can freely rotate around the pin; the plume is then ejected from the pin (Figure b). The position of the plume is monitored on the surface and the procedure is repeated with a pin inserted at any other point (or number of points) outside the object's centroid. The unique intersection of these lines will be the centroid (Figure c). Assuming that the body has a uniform density, all the lines produced in this way will include the centroid, and all the lines will cross exactly in the same place. and (b) This method can theoretically be extended to concaving shapes where the centroid can lie out of shape, and practically to solids (again uniform density), where the centroid can lie in the body. The (virtual) positions of plumes must be recorded by means other than drawing them along the shape. Balancing Method For convex two-dimensional shapes, the center of gravity can be found by balancing the shape on a smaller shape, such as at the top of a narrow cylinder. The centroid occurs somewhere in the range of contact between two shapes (and exactly where the shape would be balanced on the pin). Progressively narrower cylinders can essentially be used to find the center to any accuracy. In practice, air currents make it useless. However, by marking the range of overlap from multiple scales, a significant level of accuracy can be achieved. From the final set of Centroid points of the final set to {\displaystyle k} points x 1 , x 2 , ... x k {\displaystyle \mathbf {x} _{1},\mathbf {x} _{2},\ldots ,\mathbf {x} _{k}} in R n {display\style \mathbb {R} ^{n}} is C = x 1 + x 2 + ⋯ + x to {\displaystyle \mathbf {C} ={\frac {\mathbf {x} _{1}+\mathbf {x} _x} _{2}+\\cdots +\mathbf {x} {k}}{k}}} . [2] This point minimizes the sum of quadratic euchuman distances between each other and each point in the set. Geometric decomposition The center of gravity of the X plane figure {\displaystyle X} can be calculated by dividing it into the finite number of simpler digits X 1 , X 2 , ... , X n {\displaystyle X_{1},X_{1},X_{1} X_{2},\dots ,X_{n}} , calculation of centroid C i {\displaystyle C_{i}} and area A i {\displaystyle A_{i}} of each part, and then computing C x = ∑ C i x A i ∑ A i , C y = ∑ C i y A i ∑ A i {\displaystyle C_{x}={°°\frac {\sum C_{i_{x}}A_{i}}{\sum A_{i}}},{ C_{y}={\frac {\sum C_{i_{y}}A_{i}}{\sum A_{i}}}} Holes in Figure X {\Display Style X} that overlap between parts or parts which extend beyond the polytic, can all be processed using negative areas A {\displaystyle A_{i}} . Specifically, both A and {\displaystyle should be A_{i}}. with positive and negative characters so that the sum of both A and {\displaystyle A_{i}} characters for all parts that close a given point p {\displaystyle p} is 1, if p {\displaystyle p} belongs to X {\displaystyle X} and 0 otherwise. For example, the image below (a) is easily divided into a square and a triangle, both with a positive area; and a circular hole with a negative face (b). (a) 2D Object(b) The object described by the simpler elements(c) The centroids of the centroid elements of each part of the Centroid object can be found in any list of simple shape centroids (c). Then the center of the number is the weighted average of three points. The horizontal position of the centroid from the left edge of the image is x = 5 × 10 2 + 13.33 × 1 2 10 2 - 3 × π 2.5 2 10 2 + 1 2 10 2 − π 2.5 2 ≈ 8.5 units . {\displaystyle x={\frac {5\times 10^{2}+13.33\times {\frac {1}{2}}10^{2}-3\times \pi 2.5^{2} {2} & lt;3>}{10^{2}+{\frac {1}{2}}10^{2}-\pi 2.5^{2}}}\approx. 8.5{\mbox{ units}}}} In the same way, the vertical position of the center is located. The same formula applies to all three-dimensional objects, with the difference that each A {\displaystyle A_{i}} should be both volume X and {\displaystyle X_{i}} , not its range. It also applies to any subset of R d {\displaystyle \mathbb {R} ^{d}} for all dimensions d {\displaystyle d} , with areas replaced by dimensional dimensions of parts d {\displaystyle d} According to the integral formula Centroid of subgroup X R n {\displaystyle \mathbb {R} ^{n}} can also be calculated by integral C = ∫ x g (x) d x ∫ g (x) d x {\displaystyle C={\frac {\int xg(x)\;d x}{\int g(x)\;d x}}} , where integrals are taken into the entire R n space {\displaystyle \mathbb {R} ^{n}} and g is a characteristic function of a subset that is 1 inside X and 0 outside it. [5] Note that the denominator is simply a scale of set X. This formula cannot be used if set X has zero measure or if there are integral deviations. The next formula for the centroid is C k = ∫ of S k (z) d of ∫ S k (z) d of {\displaystyle C_{k}={\frac {\int zS_{k}(z)\;d z}{\int S_{k}(z)\;d z}}}, where Ck is kth coordinatec C, and Sk(z) is the intersection rate of X with hyperplach defined by the equation xk = z. Again, the denominator is simply measure X. Especially for the barycenter coordinate plane, C x = ∫ x S y (x) d x A {\displaystyle C_{\mathrm {x} }={\frac {\int xS_{\mathrm {y} }(x)\;d x}{A}}} C y = ∫ y S x (y) d y A {\displaystyle C_{\mathrm {y} }={\frac {\int yS_{\mathrm {x} }(y)\;d y}{A}}}, where A is the area in Figure X; Sy(x) is the length of the intersection of X with the vertical line to abscissa x; and Sx(y) is a similar amount for the exchanged axis. Bounded Centroid area (x̄ , ȳ) {\displaystyle ({\bar {x}},\;{ \bar {y}})} area bounded continuous function graphs f {\displaystyle f} and g {\displaystyle g} so that that f (x) ≥ g (x) {\displaystyle f(x)\geq g(x)} in the interval [a , b] {\displaystyle [a,b]} , and ≤ x ≤ b {\displaystyle a\leq x\leq b} , is given x ¯ = 1 A ∫ and b x [f (x) − g (x)] d x {\displaystyle {\bar {x}}={°\frac {1}{A}}\int _{a}^{b}x[f(x)-g(x)]\;d x} [5] y ¯ = 1 A ∫ and b [f (x) + g (x) 2] [f (x) − g (x) d x , {\displaystyle {\bar {y}}={\frac {1}{A}}\int _{a}^{b}\left[{\frac {f(x)+g(x)}{2}}\right][f)-g(x)]\;d x,} [6] where A {\displaystyle A} is the region area (given ∫ and b [f (x) − g (x)] d {\displaystyle \int _{a}^{b}[f(x)-g(x)]\;d x}). [7] [8] From an L-shaped object This is a method of determining the center of gravity of an L-shaped object. Find the centers of these two rectangles by drawing diagonals. Draw a line connecting the centroids. The center of the shape must lie on this line AB. Divide the shape into two more rectangles, as shown in Fig. Find the centers of these two rectangles by drawing diagonals. Draw a line connecting the centroids. The L-shaped center disc must be on this cd. Since the centroid of the shape must lie along the AB and also along the CD, it must be at the intersection of these two lines in O. Point O may lie inside or outside the object in the form of the letter L. From the triangle the center of the triangle is the intersection of its centers (lines connecting each vertex with the center of the opposite side). [4] Centroid divides each of the medians in a ratio of 2:1, which means that it is located 1/3 of the distance from each side to the opposite vertex (see pictures on the right). [9] [10] Its Cartesian coordinates are the means of the coordinates of the three vertices. This means that if there are three vertices L = (x L , y L) , {\displaystyle L=(x_{L},y_{L}),} M = (x M , y M) , {\displaystyle M=(y_ x_{M},y_{M}),} and N = (x N , y N), {\displaystyle N=(x_{N},y_{N}),} then centroid (marked C here, but most commonly referred to as G in triangle geometry) is C = 1 3 (L + M + N) = (1 3 (x L + x M + x N), 1 3 (y L + y M + y N)). {\displaystyle C={\frac {1}{3}}(L+M+N)=left({\frac {1}{3}}(x_{L}+x_{M}+x_{N})\;; \frac {1}{3}} {y_{L}+y_{M}+y_{N}}\right).} Thus, the centroid is at 1 3:1:3:1{\displaystyle {\tfrac {1}{3}}:{\tfrac {1}{3}}:{\tfrac {1}{3}}} in barycentric coordinates. For trilinear coordinates, the centroid may be expressed in any of the following equivalent ways in terms of lateral lengths a, b, c and vertex angles L, M, N:[11] C = 1 a : 1 b : 1 c = b c : c and : a b = csc L : csc M : csc N = cos L + cos M, cos N : cos M + cos N : cos N + cos L, cos M = with L + s M × s with N: with M + with × with L: with N + sec L × sec M . {\displaystyle {\begin{aligned}C&={°°frac {1}{a}}:{\frac {1}{b}}:{\frac {1}{c}}=bc:ca:ab=\csc L:\csc M:\csc N\\[6pt]&=\cos L+\cos M\cdot\cos N :\cos M+\cos N \cdot\cos L:\cos N+\cos L\cdot\cos M\\ [6pt]&=\sec L+\sec M\cdot\sec N:\sec M +\sec N\cdot\sec L:\sec N+\sec\s M.\end{aligned}} Centroid is also the physical center of matter when the triangle is made of an even sheet of material; or if all matter is concentrated on three vertices and evenly distributed between them. On the other hand, if the mass is distributed along the circumference of the triangle with a uniform linear density, then the center of the mass lies in the conspiratorial center (incenter of the median triangle), which (in general) does not match the geometric center of the entire triangle. The area of the triangle is 1.5 times the length of any side times the perpendicular distance from the side to the centroid. [12] The triangle's centroid lies on its Euler line between its orthocenter H and its O circuit, exactly twice as close to the second as the first: C H¯ = 2 C O¯. {\display style {\overline {CH}}=2{\overline {CO}}.} [13] [14] In addition, for the incenter I and nine-point center N, we have C H ¯ = 4 C N ¯ C O ¯ = 2 C N ¯ I C ¯ < H C ¯ I H ¯ < H C ¯ I C ¯ < I O ¯ {\displaystyle {\begin{aligned}{\overline {CH}}&=4{\overline {CN}}\\[5pt]{\overline {CO}}&=2{\overline {CN}}\\[5pt]{\overline {IC}}&<{\overline {HC}}\\[5pt]{\overline {IH}}&<{\overline {HC}}\\[5pt]{\overline {IC}}&<{\overline {IO}}\end{aligned}}} If G is the centroid of the triangle ABC, then: (Area of △ A B G) = (Area of △ A C G) = (Area of △ B C G) = 1 3 (Area of △ A B C) {\displaystyle \displaystyle ({\text{Area of }}\triangle \mathrm {ABG})=({\text{Area of }}\triangle \mathrm {ACG})=({\text{Area of }}\triangle \mathrm {BCG})={\frac {1}{3}}({\text{Area of }}\triangle \mathrm {ABC})} The isogonal conjugate of a triangle's centroid is its symmedian point. Any of the three medians through the centroid divides the triangle area in half. This does not apply to other lines through the centroid; the greatest deviation from the division of the same face occurs when the line through the centroid is parallel to the side of the triangle and forms a smaller triangle and trapezoid; in this case, the trapezoid area is 5/9 of the area of the original triangle. [15] Let P be any point in the plane of the triangle with vertices A, B and C and centroid G. Then the sum of the quadratic distances P from the three vertices exceeds the sum of the quadratic distances of centroid G from the vertices by three times the square distance between P and G: P A 2 + P B 2 + P C 2 = G A 2 + G B 2 + G C 2 + 3 P G 2 . {\displaystyle PA^{2}+PB^{2}+PC^{2}=GA^{2}+GB^{2}+GC^{2}+3PG^{2}.} [16] The sum of the squares of the sides of the triangle is three times the sum of the second to the second from the peaks: A B 2 + B C 2 + C A 2 = 3 (G A 2 + G B 2 + G C 2). {\displaystyle AB^{2}+BC^{2}+CA^{2}=3(GA^{2}+GB^{2}+GC^{2}.} [16] The triangle centroid is a point that maximizes the product of the controlled distance of a point from the sideline of a triangle. [17] Let abc be a triangle, let G be its centroid, and let D, E, and F be the midpoints of BC, CA, and AB, respectively. For each P point in the ABC plane then P A + P B + P C ≤ 2 (P D + P E + P F) + 3 P G . {\displaystyle PA+PB+PC\leq 2(PD+PE+PF)+3PG.} [18] From the polygon Jecentroid closed polygon, which does not intersec itself, defined n vertices (x0,y0), (x1,y1), ..., (xn−1,yn−1) is a point (Cx, Cy),[19] where C x = 1 6 A ∑ i = 0 n − 1 (x i + x i + 1) (x i y i + 1 − x i + 1 y i), {\displaystyle C_{\mathrm {x} }={frac C_ {x} }={frac {1} C_ <2> <1>{6A}}\sum _{i=0}^{n-1}(x_{i}+x_{i+1})(x_{i}\ y_{i+1}-x_{i+1}\ y_{i}}.),} and C y = 1 6 A ∑ i = 0 n − 1 (y i + y i + 1) (x i y i + 1 − x i + 1 y i) , {\displaystyle C_{\math rm {y} }={\frac {1} x_ <2>{6A}}\sum _{i=0}^{n-1}(y_{i}+y_{i+1})(x_{i}\ y_{i+1}-x_{i+1}\ y_{i}) ,} and where A is the emimisity of the polygon,[19] as described in the lace formula: A = 1 2 ∑ i = 0 n − 1 (x i y i + 1 − x i + 1 y i) . {\displaystyle A={\frac {1}{2}}\sum _{i=0}^{n-1}(x_{i}\ y_{i+1}-x_{i+1}\ y_{i}).} In these formulas, it is assumed that the vertices are numbered in order of their occurrence along the perimeter of the polygon; In addition, it is assumed that the vertex (xn, yn) is the same as (x0, y0), which means i + 1 {\displaystyle i+1} in the last case must loop around i = 0 {\displaystyle i=0} . (If the points are numbered clockwise, area A calculated above will be negative; however, the centroid coordinates will be correct in this case.) The cone or pyramid of the Centroid cone or pyramid is located on the line segment that connects the vertex with the centroid of the base. For a solid cone or pyramid, the centroid is 1/4 of the distance from the base to the top. For a cone or needle that is only a hollow shell without a base, the centroid is 1/3 of the distance from the base plane to the top. Of the four-walled and n-dimensional simplex, the four-walled object is in three-dimensional space with four triangles like its faces. A line segment connecting the top of a square with the centeroid of the opposite face is called the median, and the line segment connecting the center points of two opposite edges is called bimedian. Therefore, there are four medians and three bimedians. These seven line segments meet in the center of tetrahedron. [20] Medians are divided by a median ratio of 3:1. The centroid of the quadboard is the center between its point Monge and the circumference (the center of the bounded sphere). These three points define the Euler line of the quadruple, which is similar to the Euler line Triangle. Generalize these results to all n-dimensional simplex as follows. If the set of simplex vertices is in 0 , ... , in n {\displaystyle {v_{0},\ldots ,v_{n}}} , then with respect to vertices as vectors, the centroid is C = 1 n + 1 ∑ i = 0 n in i . {\displaystyle C={\frac {1}{n+1}}\sum _{i=0}^{n}v_{i}.} A geometric centroid coincides with the center of matter when the mass is evenly distributed over the entire simplex or concentrated on vertices as n +1 of the same mass. From the hemisphere, the center of the fixed hemisphere (i.e. half of the fixed sphere) divides the segment of the line connecting the center of the sphere with the hemisphere pole in a ratio of 3:5 (i.e. lies 3/8 of the path from the center to the pole). The center of the hollow hemisphere (i.e. half of the hollow sphere) divides the segment of the line connecting the center of the sphere with the hemisphere pole in half. See also Chebyshev Center Fréchet Medium K-means Algorithm List of Centroids Location of The Center of Matter Medoid Pappus is a centroid theorem Spectral centroid triangle center Notes ^ Protter & Morrey, Jr. (1970, p. 521) ^ a b Protter & Morrey, Jr. (1970, p. 520) ^ Court, Nathan Altshiller (1960). Notes on the centroid. Math teacher. 53 (1): 33-35. JSTOR 27956057. ↑ a b Altshiller-Court (1925, p. 66) ^ a b Protter & Morrey, Jr. (1970, p. 526) ^ Protter & Morrey, Jr. (1970, p. 527) ^ Protter & Morrey, Jr. (1970, p. 528) ^ Larson (1998, p. 458–460) ^ Altshiller-Court (19 25, p. 65) ^ Kay (1969, p. 184) ^ Encyclopedia of Triangles Encyclopedia of Triangular Centers Archived from the original on 2012-04-19. They were acquired in 2012-06-02. ^ Johnson (2007, p. 173) ↑ Altshiller-Court (1925, p. 101) ^ Kay (1969, p. 18,189,225–226) ^ Bottomley, Henry. Medians and budgeting of triangle areas. 27 September 2013. ↑ a b Altshiller-Court (1925, p. 70-71) ^ Kimberling, Clark (201). Trilinear distance inequalities for symmedian point, centroid, and other triangle centers. Geometricorum Forum. 10: 135–139. ↑ Gerald A. Edgar, Daniel H. Ullman & Douglas B. West (2018) Problems and Solutions, American Mathematical Monthly, 125:1, 81-89, DOI: 10.1080/00029890.2018.1397465 ^ a b Bourke (1997) ^ Leung, Kam-tim; and Suen, Suk-nam; Vectors, Matrix and Geometry, Hong Kong University Press, 1994, p. 53–54 Reference Altshiller-Court, Nathan (1925), College Geometry: Introduction to Modern Triangle and Circle Geometry (2nd Ed.), New York: Barnes & Noble, LCCN 52013504 Bourke, Paul (July 1997). Calculation of the area and centroid of the polygon. Johnson, Roger A. (2007), Advanced Euclidean Geometry, Dover Kay, David C. (1969), College Geometry, New York: Holt, Rinehart and Winston, LCCN 69012075 Larson, Roland E.; Hostetler, Robert P.; Edwards, Bruce H. (1998), Number of one variable (6. Mifflin Company Protter, Murray H.; Morrey, Jr., Charles B. (1970), Calculus College with Analytical Geometry (2nd ed.), Reading: Addison-Wesley, LCCN 76087042 External References Encyclopedia of Triangular Centers by Clark Kimberling. Centroid is indexed as X(2). The characteristic feature of Centroid's cut-the-node Barycentric Coordinates on cut-the-node Interactive animations showing centroid triangle and centroid structures with compass and straightedge experimentally find the medians and center of the triangle on Dynamic Geometry Sketches, an interactive dynamic geometry sketch using the Cinderella gravity simulator. Loaded from