Oval and ellipse

On the main page Mathematische Basteleien What are an Oval and an egg curve? There is no clear defiion. Above all define: ...... An oval is a closed airplane line, which is like an ellipse or like the shape of a hen's egg. An egg curve is only the border line of a hena egg. The hena egg is smaller at one end and has only one shaft of symmetry. The oval and egg-shaped curve are convex curves, differ twice and have a positive curvature. ...... It is distinguished between the oval, the ovoid and the oval shape in the same way as between the circle, the figure of the circle and the sphere. Ellipse and its top Ellipse All points P changes, for which the distances of two fixed points or foci F1 and F2 have a constant sum, form an ellipse. The ellipse in the central position has the following Cartesian equation. Parameters a and b are called axis lengths. Ellipse is the formula of a relationship. ...... The left ellipse has the equation The constant sum is 2a=6. ... You can add two different ellipse halves to form a chicken egg. Building a gardener You can draw an egg curve, if you wrap a rope (green) around a triangle of isosceles and draw with taut rope a closed line (1). The rope should be slightly longer than the circumference of the triangle. The arcs of elllipsa develop, which together form an egg-shaped curve (2). The three main ellipse are fully drawn in a computer simulation (2, black, red, blue, book 9). You are more accurate, if you draw three more ellipses in the sector of the vertical angles of triangle angles on the sides AB, AC und BC (3,4). Super Ellipse ...... If you take exponent 2.5 instead of 2 in the equation $(x/a)^2+(y/b)^2=1$, you get the equation of a super ellipse: The module | ensures that the roots are defined. The drawing is at=3 and b=2. The Danish author and scientist Piet Hein (1905-1996) treated in great detail the super ellipse (book 4). In particular, that shape made by rotation around the X axis may be on top, if it is made of wood. You don't have to use power in contrast to Columbus's egg. They have the equations...... In the drawing there is a=3, b=2 and replace n with 1(parallelogram, blue), 1.5(green), 2 (Ellipse, bright red), 2.5 (super ellipse, red) and 3 (black). From the Oval to the shape of the egg you can develop the shape of a hena egg, if you change the equation of an oval a little. They multiply y or y^2 by a suitable term t(x), so that and it gets bigger on the right side of the y axis and smaller on the left side. y(x=0) should not be changed. The ellipse equation, for example, $x^2/9+y^2/4=1$ change to $x^2/9+y^2/4*t(x)=1$. Here you multiply y^2 with t(x). Three examples: On the red egg-shaped curve: The ellipse is black. The egg curve Red. It is under the right-hand ellipse axis y. The term is more than 1. Number 4 ($=b^2$) is smaller by multiplication of $y^2/4$. So the curves belong to ellipses with smaller axes. It's under the black ellipse. Corresponding explains why the red curve is above the black ellipse to the left of the y axis. (Multiplied with a number less than 1...) On blue and green egg curves: They have roughly the same shape, although the equations are different at first glance. But: t2(x)=1/(1-0,2x) can be written as geometric series. There are usually $1/(1-q) = 1+q+q^2+...$, here is $1/(1-0,2x) = 1+0,2x+0,04x^2+...$ t3(x)=exp(0.2x) kann will develop as Taylor's series There is usually $f(x) = f(0)+x*f'(0)+x^2*f''(0)+...$, here is $ex(0.2x) = 1+0,2x+0,02x^2+...$ To compare $t1(x)=1+0,2*x+0*x^2$. The three terms t1, t2 und t3 differ in the series not until the square term. In addition there is t1<t3(x)<t2(x). If you draw the three egg curves that accompany it, the red curves are exterior, the green in the middle and the blue inside. Why the blue egg-shaped curve inside the red? Smaller axes belong to t2(x) compared to t1(x). ...... From egg to Triangle...... If you replace the term t(x)=(1+kx)/(1-kx) in the equation $x^2/9+y^2/4*t(x)=1$, get the curves on the left for different k numbers. black: k=0.1 red: k=0.2 green: k=0.3 blue k=1/3. The black egg becomes a blue triangle. The black egg is the same as those of t1(x), t2(x) oder t3(x) above, because the geometric series $(1+0,1x)/(1-0,1x)=1+0.2x+0.02x^2+...$ corresponding to the first terms. Get a triangle for k=1/3. a=3 is the main axis. Test: Equations $x^2/a^2+y^2/b^2*(1+x/a)/(1-x/a)=1$ and $(x/a+y/a-1)(x/a-y/b-1)(x/a+1)=0$ are equivalent. If you simplify both terms, you get $-b^2x^3+ab^2x^2+a^2b^2x+a^2xy^2+a^3y^2-a^3b^2=0$. The 3 triangle lines are described by the 3 factors of $(x/a+y/b-1)(x/a-y/b-1)(x/a+1)=0$ Letter ...... Don M. Jacobs, M.D., of Daly City, USA developed a good egg shape by changing the equation of the circle $x^2+y^2 = 1$ bit: $x^2 + [1.4^x*1.6y]^2 = 1$. The egg equation is an exponential equation of the type t3. This shows this conversion: . In investing an Ellipse in a circle ... If you reflect a straight line ellipse, you get an ellipse again (left). If you reflect a circle ellipse, you get an egg curve (right). An investment is the function of the Argand one-one plan for reciprocal radii or a circle reflection with radius R. The center of reflection is the origin (0|0). The equation of the function is $z'=R^2/z$. More curves such as Loci de Punts top Cassini Ovals All P points, for which distances of two fixed points or foci F1 and F2 have a constant product, form an Oval Cassini. Cassini oval has next Cartesian equation in central position - $2e^2(x^2-y^2) - (a^2)^2 + (e^2)^2=0$. 2e és la distància d'ambdós punts fixos, a^2 és el producte constant. ...... La corba de l'esquerra té l'equació $(x^2+y^2)^2 - 72(x^2-y^2) - 2800 = 0$. Hi ha e=6, a=8. Aquest dibuix es va originar a partir de la fixació e = 6 i la substitució d'un = 10 (blau), 8.5 (gris), 7 (vermell), 6 (negre) und 4 (verd) a la fórmula. Generalment deia: Si a>[e multiplicat per l'arrel quadrada de 2] hi ha una figura d'ou. Si a=[e multiplicat per l'arrel quadrada de 2] també hi ha una figura d'ou, però la curvació és 0 a l'eix vertical. Si e <> <[e multiplied= by= the= square= root= of= 2]= there= is= a= figure= cut= into= the= middle.= if= a=e there= is= a= lemniskate.= if=></[e> <e there= are= two= ovals.= the= ovals= inside= with=></e> <e have= interesting= egg= shapes= if= the= variable= a= approaches= e=6. cartesian= ovals = all= points,= for= which= the= simple= and= the= double= distances= of= two= fixed= points= or= foci= f1= and= f2= have= a= constant= sum,= form= a= cartesian= oval.= the= cartesian= oval= has= the= following= cartesian= equation.= $4a^2m^2((c-x)^2+y^2)-(a^2+m^2c^2-2cm^2x+(m^2-1)(x^2+y^2))^2=0$ c= is= the= distance= of= the= fixed= points= and= m=2 (double= distance).= the= origin= of= the= coordinate= system= is= the= left= fixed= point. = this= long= equation= is= derived= with= the= formulation= s1+2*s2=a and= by= using= pythagoras'= formula= twice.= ......= the= distance= of= the= fixed= points= is= c=5 and= the= sum= a=12. the= equation= is= now= $2304((5-x)^2+y^2)=$ -= $(3x^2+3y^2-40x+44)^2=0$. ....= the= graph= from= above= is= incomplete.= surprisingly= the= equation= $2304((5-x)^2+y^2)-(3x^2+3y^2-40x+44)^2=0$ produces= another= curve= outside= the= egg= curve.= ....= if= you= substitute= m=2 with= m=2.2, you= produce= another= egg= shape.= you= keep= c=5 and= a=12. these= egg= curves= go= back= to= renatus= cartesius= alias= rené= descartes= (1596-1650),= therefore= the= name.= curves= by= loops= szegö= curve= $x^2+y^2=e2x-2$ $x^2+y^2+0,02=e2x-2$ folium= of= descartes= $x^3+y^3=3xy$ $x^3+y^3+0,06=3xy$ $(x^2+y^2)^3-4x^2y^2=$ $(x^2+y^2)^3+0,001-4x^2y^2=$ more= egg= curves= this= way:=>Trisextrix de MacLaurin $y^2(1+x)+0,01=x^2(3-x)$ >Lemniskate de Bernoulli $(x^2+y^2)^2-(x^2-y^2)+0,01=0$ >Conchoid de sluze $0,5(x+0,5)(x^2+y^2)-x^2+0,02=0$ ... (Idea de Torsten Sillke) Dibuix de Fritz Hügelschäffer Transfer el conegut dibuix d'una el·lipse amb l'ajuda de dos cercles concèntrics (a l'esquerra) a una figura de dos cercles. Dibuixar en l'ordre M1, M2, P1, P2 , i P. a i b són els radis dels cercles, d és la distància dels seus centres. Els paràmetres a, b, c són adequats per descriure la forma de l'ou. 2a és la seva longitud, 2b la seva amplada i d mostra la posició més àmplia. L'equació de la corba en forma d'ou és una equació de tercer grau: $x^2/a^2 + y^2/b^2[1 + (2dx+d^2)/a^2] = 1$ $b^2x^2+a^2y^2+2dxy^2+d^2y^2-a^2b^2=0$ La corba en forma has the parameters a=4, b=2 und d=1. The equation is $4x^2+16y^2+2xy^2+y^2-64=0$. Second example: in this example there are a=4, b=3, and d=1. The equation is</e> is</e> Source: (11), page 67/68 Granville Egg Curve >There is a line, which starts at point A and is located horizontally. Then there is a vertical line in the distance of one and a circle with radius r being symmetrical to the horizontal line at the distance of a +b (drawing on the left). >If you draw a line (red) from point A, cut the vertical line to B and circle to C. If you then draw a vertical line through C and a horizontal line through B (green), they are in P. >If point C moves along the circle, then the P points are on an egg-shaped curve (animation on the right). See more: (13), Jan Wassenaar (Granville egg, URL below), Torsten Sillke (Granville egg, URL below) Mechanical construction of the Let P egg curve be a fixed point and a point, which moves in a circle around P with radius r =PA. Links the bar a=QA to A . Your free end Q moves horizontally through P back and forth. Point B of line AQ with BQ=b describes an egg-shaped curve. See more: (12), www.museo.unimo.it/theatrum/macchine/, Jan Wassenaar (quartic egg curve, UNTEN URL) Egg chains top A double egg... The polar form $r(t)=\cos^2t$ produces a double egg (Münger 1894). A second equation is $r(t)=ex(body(2t)*\cos^2(t)$ (Hortsch 1990). Another double egg The equation $x4+2x^2y^2+4y4-x^3-6x^2-xy^2=0$ produces a double egg. There is a wide field of experimentation. Chains can form and combine sinus curves in such a way that you get a string of eggs. Poliominals can also produce strings (see Torsten Sillke, URL below). The equation $y^2 = abs[\sin(x)+0.1\sin(2x)]$ describes a more elegant sine string: (Torsten Sillke) Egg curves with Top Arches ... ... Two small circles (red) and two large (gray) quarters, which have a square in common, form an oval. (The angles of the sectors should not be 90°.) ...... A semicircle (green), a fourth circle (red) and two eighth circles (gray), which have a triangle in common, form a second figure. If you cut the egg into nine pieces, you get the tangram puzzle The Magic Egg or The Pigeon Egg. ...... You can generalize the figure: Take a smaller dark grey triangle. ... Divided and reassembled again...... Divided and reassembled again. (14), Seite 122.. Section through top rotation shapes If you make a sloping section through a cone or cylinder you often get an ellipse as a section line. If you choose a hyperbolic funnel, you get egg curves in the form of a hena egg. Hyperbolic funnels are figures, which develop from the rotation of a hyperbole around the symmetry axis. ... There is the hyperbolic funnel to $f(x) =1/x^2$. The y axis is perpendicular to the x-z-plane in the direction of the back. The straight line shows the section plane perpendicular to the x-z-plane. ... The given plane intersects the funnel with three points on the x-z-plane. If you project the section lines in the get the red curves. ... You get an egg curve in the section plan. Formulas: If you make a sloping section across other figures, get more egg curves. More curves top Equations of 3rd and 4th Grade ...... Equations with form $y^2=p(x-a)(x-b)(x-c)$... produce egg curves. There are two examples on the left: $2y^2=(x-1)(x-2)(x-3)$ and $y^2=(x-1)(x-2)(x-3)(x-4)$ The Folium ... The polar form $r(t)=\cos^3t$ produces the wrong folio or kepler egg. A crooked egg Jedes legt noch schnell ein Ei und dann kommt der Tod herbei. Each still lays a final egg, then comes death and out of the clamp. (Claim) ...... The polar equation $r(t)=syn^3t+\cos^3t$ produces a crooked egg ;-). Vertical egg ... Torsten Sillke's Egg from Columbus y^4+10y^2x^2+5x^4 = y New Eggs These egg curves were discovered by Florian Blaschke (Email from 02.07.2016). x^1.5-1.5^0.5x+y^2 = 0 x^1.5-a^0.5x+y^2 = 0 and a=1, 2, 3 New Egg ... This egg curve was discovered by Florian Blaschke (E-Mail on 23.09.2018)...... 2y(x^2)+e*(y-3)^2=6.4 e is Euler's number. New egg ... Adrian Skovgaard discovered this website and sent me another egg. x^2 = 3*sqrt(2y+1)-2y-3 (Email sent on April 27, 2020) Top English references: (1) Lockwood, E. H.: A curve book. Cambridge, England: Cambridge University Press, p. 157, 1967. (2) Martin Gardner: The Latest recreations, hydras, eggs, and other mathematics.mystifications, Springer, New York 1997 German: (3) Sz.-Nagy, Gyula: Tschirnhaussche Eiflaechen und Eikurven. Acta Math. Acad. Sci. Hung. 1, 36-45 (1950). Zbl 040.38402 (4) Ulrich/Hoffman: Differential- und Integralrechnung zum Selbstunterricht, Hollfeld 1975 (5) Martin Gardner: Mathematischer Karneval, Frankfurt/M, Berlin 1977 (6) Gellert...: Kleine Enzyklopädie - Mathematik, Leipzig 1986 (7) Wolfgang Hortsch, Alte und neue Eiformeln in der Geschichte der Mathematik, Muenchen, Selbstverlag 1990, 30S (8) Gebel und Seifert, Das Ei einmal anders betrachtet, (eine Schülerarbeit) Junge Wissenschaft 7 (1992) (9) Hans Schupp, Heinz Dabrock: Höhere Kurven, BI Wissenschaftsverlag 1995 (10) Gardner, Martin: Geometrie mit Taxis, die Koepfe der Hydra und andere mathematische Spielereien. Basel: Birkhaeuser (1997), Deutsche Ausgabe von (2) (11) Elemente der Mathematik 3 (1948) (12) Karl Mocnik: Ellipse, Ei-Kurve und Apollonius-Kreis, Praxis der Mathematik. (1998) v. 40(4) p. 165-167 (13)W. A. Granville: Elements of differential and integral calculus, Boston, (1929) (14) Heinz Haber (Hrsg.): Mathematisches Kabinett, München 1983 [ISBN 3-423-10121-0] Egg curves at the top of the Deutsch Internet Michael Hinterseher Eilinien (mit Klotoiden) Projekt der Universität Würz Mathematik ran ums Ei Wikipedia Oval (Geometrie), Ei-Kurve, Ellipse, Superellipse, Cassinische Kurve, Ei des Kolumbus, Englisch André Heck A potpourri of mathematical egg curves RED GEOMETRY OF THE PARABLE ACCORDING TO THE GOLDEN NUMBER Chickscope PROJECT at the Beckman Eggmath Eric W Institute. Weisstein (MathWorld) Oval, Cartesian Ovals, Cassini Ovals, Ellipse, Cundy and Rollett's Egg, Mosss Egg, Lemon, Superellipse, Jan Wassenaar 2dcurves Paul L. Rosin On the Construction of Ovals Richard Parris (Freeware-Programm WINPLOT) Die offizielle Webseite ist geschlossen. Download from Deutschen Programms z.B. bei heise The MacTutor History of Mathematics archive (Created by John J O'Connor and Edmund F Robertson) Cassinian Oval, Folium, Cartesian Oval, Torsten Sillke Egg in the form of Granville's egg curves - quartic [Granville 1929] Cubic curves such as ellipse disturbed mechanical egg curve construction by a two-bar link - a quartic polynomial that makes Newton cubic egg chains: Apollonian cubic elliptical curve Transform the toric sections of the Gallery of Graphics Limacon el·lipse - Proclus hippopotamus: analyzed by Perseus The Family r = cos^p(phi) or [Münger Eggs] Multifocal curves - Tschirnhaussche Eikurven Pivot transform the construction of path-curves Bezier Cassini oval, Superellipse, Peter the Great (ou Fabergé), Ou Fabergé, Egg Decoration , Columbus Egg Zvonimir Durcevic CIC SECTIONS AND THEIR SPECIAL CASES Französisch Robert FERRÉOL (mathcurve) OVOÏDE , OVALE DE DESCARTES, ELLIPSE, FOLIUM SIMPLE, OEUF DOUBLE, Oeuf d'Ehrhart, ŒUF DE GRANVILLE, COURBE DE ROSILLO, OVOÏDE Serge MEHL Ovale, Cassini Holländisch NN Ovals (published in: Pythagoras, wiskundetijdschrift voor jongeren, December 2000) Een eitje, zo'n eitje Usbekistanisch admin @ arbuz.uz u cassini.html Dänisch Erik Vestergaard Ellipser og æg, Piet Heins Superellipse Tschechisch Jirka Landa Rovnice vají?ka - jednoduchá jako Kolumbovo vejce, Velikonoční speciál (Video) Japanisch Nobuo YAMAMOTO Equation of the real egg-shaped curve is found, egg-shaped curve equation II, egg-shaped curve equation III A.Gärtl, Willi Jeschke, Torsten Sillke, Gail off the coast of Oregon - thank you. Comments: Email to my homepage This page is also available in German. URL of my homepage: top