Conics worksheet (circles parabolas hyperbolas and ellipses)

Description of LT's : LEARNING TARGETS 2016 10.2 Parabola Day 1 with SubPlease play the following video for MOnday October 31 in Extended Pre-Calculus Period 5VIDEO - Directrix and Focus DATE LESSON HOMEWORK 10/13TH URS PRe ch 10 - Review of the completion of HW Square 1: Completion of the Square for Parabolas - Answers are on the END sheet 10/14Fri 10.1 Circle notes HW 2: 10.2 day 1 Before yellow wkst #1 No-7 from in its Class Circle Leaf - Solutions 10/17Mon 10.1 Circles Day 2 HW 3: Circles DAy 2 Sheet 10/18Tues 10.3 Ellipses - Ellipse Notes HW Ellipse Leaf - Make 1-3 for HW Solution 10/19WED SAT TEST 10/20THurs 10.3 Ellipses - Day 2 In class we finished #4-9 from yesterday's sheet. HW 5: 10.3 p 657 No 13-16 All, 27, 33, 35, 49 10/21FRI quiz upon completion of the square, laps, and Ellipses 10/24Mon 10.4 Hyperbols - Notes - Chart HW 6: Hyperbola Sheet - Solutions 10/25TUES 10.4 Hyperbolas day 2 - writing equations HW 7: Hyperbola sheet Day 2 Solutions10/26WEDReview laps, Ellipses AND Hyperbolas SELF rating LT's So Far - please completeHW 8 Review sheet 10/27THURS quiz on laps, ellipses and hyperbole Finish any unfinished homework so far. Early release for Parent Teachers ConferencesLink on 10/28FRI NO SCHOOL 10/31Mon 10.2 Parabola Day 1 with SubVIDEO and Focus HW 9: 21, 23 31 33 41 43, 61 11/1Tues10.2 Parabola - Day 2 HW 10: Parabola Leaf - Solutions11/2WED Review of All Conics HW 11: Review Sheet -Solutions 11/3THURS Review HW 11 Review sheet-solution 11/4FRI Part 1 Test on Conics - Chart (without calc) 11/7Mon Part 2 TEST at Conics Conic Sections and Square Relationships Parabolas Circles Ellipses Hyperbole If you see this message, this means that we are having trouble downloading external resources on our site. If you're behind a web filter, please make sure the domains no.kastatic.org and no.kasandbox.org unlocked. Here's a graphic preview for all the conic sections of the sheets. You can choose different variables to customize these Conic Sections for your needs. These Conic Sections Sheets are created randomly and will never be repeated, so you have an endless supply of quality Conic Sections sheets for use in the classroom or at home. Our Conic Sections are free to download, easy to use and very flexible. These conic sections sheets resource for students from 9th to 12th grade. Click here for a detailed description of all the conic sections of the sheets. Click the image to be taken in that Conic Sections sheets. The Properties of Circle Tables These Conic Sections Sheets will produce problems for the student to determine the center and radius of the equation. You can choose which types of numbers will be used in the problems, as well as the shape of the equations. These Conic Sections Sheets are a good resource for students in the 8th grade through 12th grade. Writing Equations Circles Sheets These Conic Sections Sheets will produce problems for writing equations of circles. You can choose the types of problems to use. These Conic Sections Sheets are a good resource for students in the 8th grade through 12th grade. The Equation Equation Sheets Chart These Conic Sections Sheets will produce problems for practicing graphing circles out of their equations. These Conic Sections Sheets are a good resource for students in the 8th grade through 12th grade. Properties Ellipses Sheets These Conic Sections Sheets will produce problems for the properties of ellipses. You can choose which properties to identify. These Conic Sections Sheets are a good resource for students in the 8th grade through 12th grade. Writing equations of ellipses Sheets These conic Sections Sheets will produce problems for writing ellipses equations. You can choose the properties of the ellipses, the data to write the equation. These Conic Sections Sheets are a good resource for students in the 8th grade through 12th grade. The Ellipse Equations Schedule Sheets These Conic Sections Sheets will produce problems to practice Ellipse graphics from their equations. These Conic Sections Sheets are a good resource for students in the 8th grade through 12th grade. Properties Parabolas Sheets These Conic Sections Sheets will produce problems for parabola properties. You can choose which properties to determine and in what form of equation will be. These Conic Sections Sheets are a good resource for students in the 8th grade through 12th grade. Writing equations parabolas sheets These conic sections of the sheets will produce problems for writing parabola equations. You can choose the properties of parabola, the data to write the equation. These Conic Sections Sheets are a good resource for students in the 8th grade through 12th grade. The Parabolas Equation Schedule Sheets These Conic Sections Sheets will produce problems for practicing Parabola graphics out of their equations. These Conic Sections Sheets are a good resource for students in the 8th grade through 12th grade. Properties Hyperbolas Sheets These Conic Sections Sheets will produce for hyperbole properties. You can choose which properties to identify. These Conic Sections Sheets are a good resource for students in the 8th grade through 12th grade. Writing equations Hyperbolas Sheets These conic Sections Sheets will produce problems for writing hyperbole equations. You can choose the properties of hyperbole, data to write the equation. These Conic Sections Sheets are a good resource for students in the 8th grade through 12th grade. The Hyperbolas Equation Schedule Sheets These Conic Sections Sheets will produce problems for practicing hyperbole graphs from their equations. These Conic Sections Sheets are a good resource for students in the 8th grade through 12th grade. Classification Conic Sections Sheets These Conic Sections Sheets will produce problems for classification conic sections. You can choose what type of conic sections to use in problems. These Conic Sections Sheets are a good resource for students in the 8th grade through 12th grade. Eccentricity Sheets These Conic Sections Sheets will produce problems for eccentricity. You can choose what type of conic sections to use in problems. These Conic Sections Sheets are a good resource for students in the 8th grade through 12th grade. This section covers: Conics (circles, ellipses, parabola and hyperbole) includes a set of curves that are formed by crossing the plane and double napped the right cone (probably too much information!). But in case you're interested, there are four curves that can be formed, and they're all used in math and science applications: In the Conics section, we'll talk about each type of curve, how to recognize and graph them, and then switch to some generic applications (sorry - another way to say the word problem). Always draw pictures first when dealing with Conics problems! Table Conics Before we go in depth with each conic, here's the Conic Equation section. Note that you can go through the rest of this section before you go back to this table, as it can be a bit overwhelming at the moment! CONIC Circle Center: (left (x, c) (right) Parabola Vertex: (left (x, (on the left((x, c) (right)) {2} in front of the negative horizontal sign (((start) left (X-h) {2} (right) {2} {2} (display x'frac{1} '4p' on the left (y-k) (right) {2}h) or (display x-h For example{1} (4p)) (right) or {2} (4p) {2} (right) coeff.) (displays style (fracas) left (h-h) {2}) {2} frak (left) (right) {2}b (left) {2} (x-h) {y-k} \right)}}^{2}}}}{{{{b}^{2}}}}=1\) Asymptotes: \(\displaystyle y-k=\pm \frac{b}{a}\left({x-h} \right)\) VERTICAL No Change \(\displaystyle y=\frac{1}{{4p}}{{\left({x-h} \right)}^{2}}+k\) or \(\displaystyle y-k=\frac{1}{{4p}}{{\left({x-h} \right)}^{2}}\) or \(4p\left({y-k} \right)={{\left({x-h} \right)}^{2}}\) Example (positive coeff.) \(\displaystyle \frac{{{{{\left({y-k} \right)}}^{2}}}}{{{{a}^{2}}}}+\frac{{{{{\left({x-h} \right)}}^{2}}}}{{{{b}^{2}}}}=1\) \(\displaystyle \frac{{{{{\left({y-k} \right)}}^{2}}}}{{{{a}^{2}}}}-\frac{{{{{\left({x-h} \right)}}^{2}}}}{{{{b}^{2}}}}=1\) Asymptotes: \(\displaystyle y-k=\pm \frac{a}{b}\left({x-h} \right)\) Other Information To get \(y\): \(\begin{array}{c}y=\\\,\,\pm \sqrt{{{{r}^{2}}-{{{\left({x-h} \right)}}^{2}}}}\\+k\end{array}\) Focal length:\(p\) Focal Width: \(4p\) Negative Coefficients : Flip parabola \({{c}^{2}}={{a}^{2}}-{{b}^{2}}\) Length of Major Axis: \(2a\) Length of Minor Axis: \(2b\) \({{c}^{2}}={{a}^{2}}+{{b}^{2}}\) Length of Transverse Axis: \(2a\) Length of Conjugate Axis: \(2b\) Note: The standard form (general equation) for any conic section is: \(A{{x}^{2}}+Bxy+C{{y}^{2}}+Dx+Ey+F=0,\,\,\,\,\text{where}\,\,\,A,B,C,D,E,F\text{ are constants}\) It actually turns out that if: \({{B}^{2}}-4AC<0\), if= a= conic= exists,= it= is= a= circle= or= ellipse= \({{b}^{2}}-4ac=0\), if= a= conic= exists,= it= is= a= parabola= \({{b}^{2}}-4ac=>0\), if a conic exists, it is a hyperbola Note: We can also write equations for circles , ellipses, and hyperbolas in terms of cos and sin, and other trigonometric functions using Parametric Equations; there are examples of these in the Introduction to Parametric Equations section. Круги Вы, вероятно, изучали Круги в классе геометрии, или даже раньше. Круги определяются как набор точек, которые равноустантные (то же расстояние) от определенной точки; это расстояние называется радиусом круга. Вот уравнение для круга, где (r) является радиусом: ((дисплей стиль (начало)array (текст) (слева) (0,),,,,0 {2}) ({2} {2} справа): текст «Центр » слева (x,»,к,к)», «справа»): «», «», «левый» («x-h» (справа)» {2} (y-k) (справа)» {2} {2} Если бы мы были решить для (r)) с точки зрения (x) (например, для того чтобы положить в калькулятор графиков), мы получили бы: «((displaystyle »начало »array»l'text »Центр »левый («0,»,»,«0»)»,,»,»,»,y'pm »sqrt»r'r'{2}-'x'{2} «Текст»Центр (слева, x, к,к) (справа): «», «», «»,»,y'pm «sqrt»r'{2}»-«левый» («x-h» ({2} справа)». Вот графики образцовых кругов, с их доменами и диапазонами: Круг с Центром («boldsymbol» слева (0,0) (справа)) Круг с Центром («boldsymbol» слева (h,k) Домен : (слева) (слева) (слева) Диапазон: ((слева) (слева) Домен: (слева) (справа) </0\) ,>Sometimes we have to complete the square to get the equation for the circle. We learned how to complete the square area here in the factoring and completing the square section. Note that once the square is completed, we can't necessarily get a round if the x {2}) and I ratios (I {2}) are not a positive one, as we'll see later. Here are some examples: Completing the problem notes of the Square Circle Find the center and radius of the next circle: (X{2}'y'y'{2}'8y-9'0) (require to cancel the display (beginning aligned 'x'{2} y'{2}'8y'9'9', x'x'{2} on the left (y'y'{2}'8y',',','i.e.g.a. ',',' and ',' and ',' emphasis, , , 8y, emphasis {2} {2} (4 right {2}) emphasize, left (4 (right) {2} x xx {2} (emphasis{4} {2} {5} {2}) right side, group (x) and (y) together and we are ready to complete the square. Please note that we do not have to complete the square for the terms x as there are no medium-term conditions. Divide the term (y) into two and square it to complete the square. Add the constant to the square on the other side. The equation is now in the shape of a circle. Note that (x-{2} 0) is the same as ((left) (x-0) (right) {2}), so this equation is a circle with a center ((((0,-4) and a radius of 5. Find the center and radius of the next circle: (X{2})y{2}-6x-12y-55'0)) (((start alignment x-{2}'-6x'y'y'{2} y'12y'0)) ({2}-6x, 'emphasis,' , , , , , right) left (y-{2}-12y, 'emphasis,' 'emphasis,' , , {2}, (right) , {2} (3 (right), (3 ({2} {2}right) (right) - 55 highlights left (3 (right) {2} (6 (right) - {2} (left{3} {2} right{6}) 2 '55'9' 9'36'left ((x-3) (right) {2} (y-6) {2} (right) right) {2} (right) {2} {10} ({2}) Moving the constants to the right, groups (x) and (y) together, And we are ready to complete the square! Divide odds (as on x) and into average terms for 2 so is the square to complete the square. Add square constants to the other side. The equation is now in the shape of a circle! This equation is a circle with a center (3,6) and a radius of 10. Complete the square and graph: xx{2}y{2}-4x-2y5'0)) x-{2}-4xyo-{2}2y-5left (x {2}-4x), emphasis, , , I, I, I, right) left (y {2}2y, emphasis (,), ,, ,right) - 5, emphasize, ,, , left (left) 2 (right) {2}, (right) left (1 yo-{2})2y emphasis left (right) {2} (right) - 5 highlight left (2 (right) {2} left (1 {2} (1 {2} (right) right) On the left (x-emphasis{2}) (right {2}) {2} (emphasize{1} right) Left (x-2) (right) {2} (y-1) (right) ({2}) Move the constant to the right side to complete the square. Divide the odds (as on x) and into average terms by 2, And a square to complete the square. but our radius is 0! For this equation, the only solution is a point at the level ((2,-1) (where the center of the circle is usually located). It's hard! Writing Circles Equations Sometimes you have to come up with circle equations {2} {2}, or tangent circles. means that it touches the circle at one point on the outside of the circle, in the radius that is perpendicular to this line: For this problem, since we only have one point on the tangent line (left), we have to get a line line tilt. Remember here in the system of coordinates and graphing lines, which perpendicular lines have slopes that are opposite reciprocity from each other. Let's draw a picture and then get a solution: Circle with Tangent Line solution We can get a line tilt that connects the center of the circle (((3,-2) and a point on the tang line ((-2.8)) and then take a negative or opposite reciprocal to get a slope of the tangent line. The slope line that contains ((3,-2)) and (-2,8)) is ((display) frac'y'{2}-'y'y'{1}'x-{2}-{1} (x-2) -2-2-2-left (3-right) - 3 (right) - frak-6-5-5-fra{6}{5} thus). , the slope of the tangent line is ((the display is frac{5}{6}). Using this tilt and point ((-2,-8) we can use either a slope interception method or a point tilt method to get the equation; Let's use tilt-interception: 8-frac{5}{6}x'b;,'-8'-frac{5}{6}left(-2)b, 8-frac {10}-{6}-frac {29} {3}'end) Equation of the tangent line {29} {3}{5}{6}: Here's another type of problem which you can see: Problems: The lines (displaystyle yfrac{4}{3}x-'frac{5}{3})) and ((displaystyle y'frac{4}{3}x-'frac'{13}'{3}) each contain the diameters of the circle, and the dot (left (-5,0) is also on this circle. be the center of the circle. In this case, it was easier to paint a picture to see that it was true: Now we can get the center of the circle by finding the intersection of two lines. Since we have another point, too, we can get a circle equation: Circle Chart Solution We can get the intersection of diameters using the replacement and setting of q (y)) equations{4}{3} equal: X-frak{5}{3}-frak{4}{3}x-frak {13} {3} frak{8}{3}x-frak{8}{3}; ',,,x'-1'y'frac{4}{3} 'left (right)-frak{5}{3}-3'end)) Now we know that the center of the circle is in no ((left (left(1,-1,-1) (right) so that the circle is in the form of: ((left) (x-1) (right) {2} (y'3) (right) {2} {2} To get a radius of the circle, we can use the Remote Formula ((shown left) ({2} (xx{1}{1}) {2} {1} left {2} (right) {2}) to get the distance between the center and this point : ((see sqrt on the left (-1-1-left (-5) (right) {2} {25} on the left (-3-0 {2} (right) Circle Equation: (left) (x 1) (right) {2} (y) (right) {2} 25). Solution: If we draw a picture, we will see that we will have to use both the Distance Formula and the Midpoint Formula from the Coordination System and Graphing Lines section. Let's draw a picture and then get a solution: Circle Graph Solution We first mapped out two points, which form the diameter of the circle that represents the pizza delivery area: ((0.18) and (-6.8).Since the center of the circle is in the middle between any two points of diameter, we can use Theorem Midpoint ((shown left), frak {1} x{2} {2}{2},,frak {1}{2} {2} (right) in order to get the center of the circle ((display style (left) (frak-6{2}, frak 18.8{2} (right) (-3.13). we can use the formula distance (s sqrt on the left (x {2}-x {1} (right) {2} the left {1} {2} (right), {2} to get the distance between the center and one from the dots; let's choose ((0.18)): ((see sqrt on the left ((0-13) (right) (right) {2} {34} (18-13) (right) {2} {2} Circle equation: On the left (x 3) (right) {2} on the left (y-13) (right) {2} 34. Parabolas Let's go back parabola (type square) but go in a little more depth here. We studied parabola in the Introduction to the Square section, but we only on vertical parabola (which either go up or down); parabola with a negative coefficient collides down (cup down). We remember that parabola is in the form (y'a'a'left (x-h (right) {2} where (left) is the top and (x'h) is the axis of symmetry or symmetry line (LOS); Note that it can also be written (y-k'a'a on the left ({2} x-h) (right) or (b)) or (b-y-k) (right) (X-h){1} {2} (right) Symmetry Line (LOS) is a line that divides a parabole into two parts that are mirror images of each other. Parabola can also be in shape (x'a'left (y-k (right) ({2}) where ((left (x, (y'k) is the top, and (y'k) is LOS; it's a horizontal parabola. , directrix is a horizontal line (i) and for horizontal (side), directrix is a vertical line (i). If (n) it is the distance from the top to the focal point (the so-called focal length), it is also the distance from the top to the directrix. This makes the distance from focus to directrix is (2p). Note that the focus is always inside the parabola on the symmetry line, and the directrix is outside the parabola. Also note that the line is perpendicular to the symmetry line (and thus parallel to the directrix) that connects the focus with the sides of a parabola called a latus chord, rectal latus, focal width, focal diameter, focal chord or focal rectum; The length of this chord is 4p. To draw a parabola if you know (p), you can just go out (2p) on either side of the focus to get more points! Here is a vertical parabola with a center ((left, 0, 0) (right)): If the top is at the source (left,-0), the vertical parabola equation is (y'a'x'{2}) and ((displaystyle a'frac{1}); If you make algebra, it follows that it (displaystyle p'frac{1} 4a). For example, if (the length of focus to the top), the parabola equation would be :(displaystyle y'frac{1} 4'4'left (4 {2} {16}{1} {2} (right) here are four different directions of parabola and generalized equations for each. but it's really not that bad; Just be sure to draw a parabola and you'll get the hang of it pretty quickly. Also, remember that K (h) always goes with I (x) and I (C)always goes with myself (i) . Vertical Parabola Horizontal Parabola Positive Ratio \(\left({0,0} \right):\,\,\,\,\,y=a{{x}^{2}}\) \(y=a{{\left({x-h}\right)}^{2}}+k\) or \(y-k=a{{\left({x-h} \right)}^{2}}\) \(\displaystyle y=\frac{1}{{4p}}{{\left({x-h} \right)}^{2}}+k\) or \(\displaystyle y-k=\frac{1}{{4p}}{{\left({x-h} \right)}^{2}}\) or \(4p\left({y-k} \right)={{\left({x-h} \right)}^{2}}\) Vertex: \(\left({h,\,\,k} \right)\) Axis of Symmetry: \(x=h\) Positive Coefficient At \(\left({0,0} \right):\,\,\,\,\,x=a{{y}^{2}}\) \(x=a{{\left({y-k} \right)}^{2}}+h\) or \(x-h=a{{\left({y-k} \right)}^{2}}\) \(\displaystyle x=\frac{1}{{4p}}{{\left({y-k} \right)}^{2}}+h\) or \(\displaystyle x-h=\frac{1}{{4p}}{{\left({y-k} \right)}^{2}}\) or \(4p\left({x-h} \right)={{\left({y-k} \right)}^{2}}\) Vertex: \(\left({h,\,\,k} \right)\) Axis of Symmetry : \(y=k\) Negative Coefficient At \(\left({0,0} \right):\,\,\,\,\,y=-a{{x}^{2}}\) \(y=-a{{\left({x-h} \right)}^{2}}+k\) or \(y-k=-a{{\left({x-h} \right)}^{2}}\) \(\displaystyle y=-\frac{1}{{4p}}{{\left({x-h} \right)}^{2}}+k\) or \(\displaystyle y-k=-\frac{1}{{4p}}{{\left({x-h} \right)}^{2}}\) or \(-4p\left({y-k} \right)={{\left({x-h} \right)}^{2}}\) Vertex: \(\left({h,\,\,k} \right)\) Axis of Symmetry: \(x=h\) Negative Coefficient At \(\left({0,0} \right):\,\,\,\,\,x=-a{{y}^{2}}\) \(x=-a{{\left({y-k} \right)}^{2}}+h\) or \(x-h=-a{{\left({y-k} \right)}^{2}}\) \(\displaystyle x=-\frac{1}{{4p}}{{\left({y-k} \right)}^{2}}+h\) or \(\displaystyle x-h=-\frac{1}{{4p}}{{\left({y-k} \right)}^{2}}\) or \(-4p\left({x-h} \right)={{\left({y-k} \right)}^{2}}\) Vertex: \(\left({h ,', ка) Ось симметрии: (як) Обратите внимание, что иногда (как в проблеме ниже) мы должны завершить квадрат, чтобы получить уравнение в параболической форме; мы сделали это здесь, в решении квадратики по факторингу и завершению площади разделе. Давайте сделаем некоторые проблемы! Проблема: Определите вершину, ось симметрии, фокус, уравнение directrix, и домена и диапазона для следующих парабол, а затем график параболы: (a {2}) (y-4'2'2'left (x-3 (справа) {2} (b) (b) (Это в стандартной или общей форме). Решение: Это, как правило, легче график параболы, а затем ответить на вопросы. Парабола Граф Решение {16}{1} (x-3) {2} (справа) Мы видим, что уравнение находится в форме (displaystyle y-k'frac{1}'4p' left (X-h) (справа) {2}), где (p) является фокусным расстоянием. Таким образом, вершина находится в левой (3,4) (справа), а ось/линия симметрии (LOS) — в 3 евро. Так как (4p'16), фокусное расстояние составляет 4.Так как точка фокусировки находится внутри параболы, она составляет 4 от (3,4) (right) so it's (left (3.8) (right)). Directrix is an outside parabola at the same distance from the top, so it is at y'0 level). To complete the chart, we can use the fact that the latus chord (the line perpendicular to LOS through focus on either side of the parabola) is (4p), so we can move (2p) (8) on each side of the focus to get points on the parabola. (We could also connect random dots in the equation for (x) to get (y)). (y'{2}-4y-2x-8'0)) (начало »выровнять»x-4'--frac{1}{2}»слева («y»{2}-4y) »x-4-цвет»#117A65» (подчеркиваю) »фрак{1}{2} (слева(2 (справа) {2}окрасный цвет #117A65-фрак{1}{2} слева (((2 x {2}-4y)цвет (#117A65) (подчеркивай) (2 (справа) {2} (справа {2}) x)) и (y'{2}), давайте попробуем поместить стандартное уравнение в форму ((Displaystyle x-h'left(- «справа») »frac{1} »4p» слева («y-k» (справа) » {2}»), где (p) является фокусной длиной. Когда мы решим для (x) (получение (x) и константы с одной стороны), мы увидим, что нам нужно завершить квадрат, чтобы мы могли получить уравнение в форме параболы. Мы получаем (x-6'-.5) влево (y-2) (справа) {2}). Из уравнения параболы мы видим, что это «горизонтальная» парабола, которая открывается влево с вершиной (слева)) и оси/линии симметрии (LOS) (LOS). С тех пор as the focal length is 4p.2), the focal length is (display (frac{1}{2}{1}{2}). Directrix is an outside parabola at the same distance from the top, so it is (x'6.5). To complete the chart, we can use the fact that the latus chord (the line perpendicular to LOS through focus on either side of the parabola) is (4p), so we can move (2p) (1) from each side of the focus to get points on the parabola. (We could also connect random dots in the equation for (x) to get (y)). Writing Parabolas problem equations: Write the parabola equation with the top (left (-2.4) and the focus point (left (0.4)). Also find the domain and parabola range. Solutions: Parabola Graf Domain Solution: ((left) (left) Top (right) (left)) and focus point (0.4) so we can see the direction of the parabola. inside the chart. We know that parabola is in shape ((x-h'frac{1} 4p' left (y-k) (right) {2}) where (p) is the focal distance. and the top is (left (-2,4) (right)), we have (display x-2) (right) frak{1} 4 on the left (2 (right) (left) or {2} ((display x-2'frac{1}{8} (left) (y-4) (right) {2} you can also write a parabola. like (display x'frac{1}{8} left) or {2} 8 on the left (x 2) (right) (y-4) ({2}). Domain: ((left, 6.5) (right) Range: ((left (oil, 6,5) (right)) focus on ((left) (-2.4) and straight out (y'9)) Best to first look at plot points, So we can see the direction of the parabol {2}{1}a. where (p) is the focal distance. Since the length from focus to directrix is :(5',',',',',',' (9-4)), and the top is precisely between focus and directrix, the focal length (length from top to focus) is display{5}{2} '2.5). The top is (left (-2,6,5) (right)). We have (display y-6.5'-frac{1} 4 left (2.5) (right) on the right) {2}) or y-6.5 -frac{1} {10} on the left (x 2) (right) {2}). It's also : ((shown y'frac{1} '{10}' left (x-2) {2} .-6.5) or (10'left (y-6.5) {2} (right) Here's another parabola problem, Which is a little more complicated: Problem: Write the equation and graph of the parabola with focus (left (2,-7) that opens to the right, and contains a point (left (6,-1)). Solution: Parabola Parabola Solution with Focus (left (2,-7) that opens to the right, parabola contains a point (left (6)). We know that the parabola equation that opens to the right is ((displaystyle x-h'frac{1} 4p' on the left (y-k) (right) {2}) where the focus point is located. Drawing parabola, we see that the top will be yu (n) units to the left of the focus, (left (2,-7) , so that the top will be at the level of (left (2-p,-7). ,-1) for (x) and (u) and (left) (left) (2-r,-7) for the left (h,k) (right) and decide for q (p){1}): pa-left (left (-1) (right) - left (-7) (right) {2} 1 4p left (8p) (right) {6}-{2};,32p,4'p'{2}'36'p'p'{2}'8p-9'0 (I,) , Left (p.9) p-1 (right) 0, pcancel-9,1endarray) Since p 1), the top is at the level of (left, 2-1,-7) (right) or left ({2} 3,-{1}{4}7). The use of Parabolas The main use of parabolas, such as ellipses and hyperbole, are their reflective properties (lines parallel to the axis of symmetry reflect focus). They are very useful in real applications such as telescopes, headlights, flashlights and so on. Problem: Equation (frac{1}{32} x'{2} display) simulates cross-sections of parabolic mirrors that are used for solar energy. In the center of each parabola is a heating tube; How high is this tube above the top of its parabola? Solution: For such problems, unless otherwise stated, just assume that the parabola top is at (0.0). Since we know that the parabola equation is (y'a'x'{2}), where ((Displaystyle a'frac{1}'4p) and (Displaystyle p'frac{1} (4aa), then for q ((display style (frac{1}{32}'x'{2}), we have ((display style (frac{1}{32}'frac{1}.4p). to see That (p'8). : The spotlight has a parabolic reflector (has a cross section that forms a bowl). The parabolic bowl is 16 inches wide from the rim to the rim and 12 inches deep. The light bulb thread is the focus. (a) What is the parabola equation used for the reflector? How far from the top is the light bulb thread? Solution: Let's chart this particular parabola by putting the top again on the th (left) (0.0)). Parabola Solution Graph (a) Since the top is at (0.0) we can put the parabola in a shape (y'a'x'{2}), where ((displaystyle a'frac{1}'4p) and (p) is focal length. It is best to draw a parabola, and since the diameter of the bowl is 16 and the height of 12, we know that the point ((8,12) is on the chart (we have to divide the diameter by 2, as this distance is all the way across). using the equation (y'a'x'{2}), where (x'8) and (y'12)... So (12-a-a-{2} on the left (8-right) and we see that (displaystyle a'frac){12}. 64}.1875). The parabola equation then is (y'.1875'x'{2}). (b) To find out how far the thread is, we need to find focus. Since then{1} as we have (displaystyle p'frac{1}'4a), we have (displaystyle p'frac{1}'4'4 (right) frac{1}.75frac{4}{3}). Thus, the distance from the top to the thread (focus{4}{3}) is an inch. Problem: Cables of the middle part of the suspension bridge in the form of a parabola, and towers supporting The cable is 600 feet apart and 100 feet high. What is the height of the cable at 150 feet from the center of the bridge? Solution: Let's draw an image of the bridge and put the middle of the cable (top) in the dot (left). Parabola Solution Schedule We know the distance between the towers is 600 feet and they are 100 feet high. Thus, we can place the point in ((300,100)) at the top of the tower (since the bridge is symmetrical). The problem asks for a parabola height of 150 feet from the center, so we need a (y) value when the x value is 150. We can get the parabola equation with q (y'a'x'{2}) and connect the point ((300,100)) in order to get {2} value:{300} (a)) ((display a'frac{100} {90000} frac{1} {900}). to find the value of {2}{1} {900}(y), when (x-150), connect to (x)): ((displaystyle y'frac{1} {900} on the left ({150} (right) {2} 25 euros). The cable is 150 feet high from the center of the bridge and is 25 feet high. Ellipse kind of looks like an oval or a football, and it's a set of dots whose distance from the two fixed points (called foci) inside the ellipse is a constant {2} {1}: Distance (2a) is called a constant amount or focal constant, and (a) is the distance between the center of the ellipse to the top (usually you don't need to worry about q (d'{1})) and (d'{1})) and (d{2})) thus, the constant amount is the distance between the verticals. Can you see that in the picture? (put two distances down flat) (center length to vertices) is always longer than (b) (center length to co-vertices). The horizontal ellipse equation, which focuses on origin (left (0.0) (right) is (displays the style of fracx{2}) {2} frac of {2} {2} (that, what is under (x) more than what is under (y)). Equation of the converted horizontal ellipse with center (h,k) is (the display (fracas) on the left (x-h {2}) and {2} the frak on the left (y-k) (right) - {2} b{2} 1). For vertical ellipses, see the table below. The longest axis (the so-called main axis) is always 2a, and it is along the axis x (x)-axis for horizontal ellipse. Again, the distance from the center of the ellipse to the top is th(a), so vertices are at the level of (left) (pm a,0 right). The length of the smaller axis (the so-called small axis or) is 2 billion euros, and it is along the axis for horizontal ellipse. Again, the distance from the center of the ellipse to the co-top is (b), so that co-vertices are at the level (left, , ... Focus is (c). The fires are in the (left c,,,,0 (right)) for this type of ellipse, and it turns out that (a {2}-b {2} ({2}). Please note also that the focal width (focus chord, or focalk) of the ellipse is q((display style (frac)2'b'{2}); it is the distance perpendicular to the main axis that runs through the focus. Here are the two different directions of ellipses and the generalized equations for each: Horizontal Ellipse Vertical Ellipse At \(\displaystyle \left({0,0} \right):\,\,\,\,\frac{{{{x}^{2}}}}{{{{a}^{2}}}}+\frac{{{{y}^{2}}}}{{{{b}^{2}}}}=1\) General: \(\displaystyle \frac{{{{{\left({x-h} \right)}}^{2}}}}{{{{a}^{2}}}}+\frac{{{{{\left({y-k} \right)}}^{2}}}}{{{{b}^{2}}}}=1\) \({{a}^{2}}-{{b}^{2}}={{c}^{2}}\) Center: \(\left({h,\,k} \right)\) Foci: \(\left({h\pm c,\,k} \right)\) Vertices: \(\left({h\pm a,\,k} \right)\) Co-Vertices: \(\left({h,\,k\pm b} \right)\) At \(\displaystyle \left({0,0} \right):\,\,\,\,\frac{{{{x}^{2}}}}{{{{b}^{2}}}}+\frac{{{{y}^{2}}}}{{{{a}^{2}}}}=1\) General: \(\displaystyle \frac{{{{{\left({y-k} \right)}}^{2}}}}{{{{a}^{2}}}}+\frac{{{{{\left({x-h} \right)}}^{2}}}}{{{{b}^{2}}}}=1\) \({{a}^{2}}-{{b}^{2}}={{c}^{2}}\) Center : (left (x,k)) Fochi: (((left, (h, km)) Verticals: ((((display left, h,), c.a)) Co-Vertical: (Right)) Basic axis length (((2a)) Small axis length (((2b) Focus width (((display) Frac 2b'{2}) You may also have to complete a square to be able to chart the ellipse, as we did here. (And since you should always have one after an equal sign, you may have to divide all the terms into a constant on the right if it's not 1). Let's put it all together and chart some ellipses: Problem: Identify vertices, co-vertices, foci, and domain and range for the following ellipses; Chart: (a) (9'x'{2} 49'y'{2}) (b) (b) Left (x-3 (right) {2} {4}-frak left (y-2 (right) {36} {2}. usually easier to schedule the ellipse first, and then answer questions: Ellipse Mathematics / Notes (a) (9'x'{2}'49'y'{2}'441)) Domain: Range: (left) (left) (left) (left) (left) (right) We first need to turn our equation into an ellipse form, dividing all terms into 441: or (the frak display {2} {49} frak {2} {9} 1)... We will use the equation (shown (frak) on the left (x-h) {2}) and {2} (right) {2} (horizontal ellipse) ({2} qgt;1). That would make q(for) {2} 49 so (a'7)... Since the center of the ellipse is ((0.0), verticals are (-7,0)) and ((7,0)). (BBC {2}) so (b'3); co-verticals are ((0,-3) and ((0.3)) now let's find hearths of (Ka {2} {2}-b{2} 49-940). (sq.s. {40} text) (left) (text or 2sqrt {10}) and foks are (display (left) (p.p., sq.s. {40}.0) (right)). It can be difficult on the chart, but just estimate to {40}) to be close to 6. Note that the swirls and hearths lie along the horizontal line. The main axis is 2a-14 euros and the length of the small axis is 2b.6). (b) (display (frak) left (x-3) (right) {2} {4}) Domain {2}: (left) {36} (left) (left) (left) (right) B) We will use the equation: ((display (frak) left ((y-k) {2} {2} (right) (right) {2} (right) {2} (vertical ellipse). (for) {2} 36), so (a'6)... Since the center is in the center: ((-3,2)), verticals are ((-3,2-6)) and ((-3,2'6), or ((-3,-4)) and ((-3,8)). (BBC {2}) so (b'2); co-verticals are (-3-2,2)) and ((-3'2,2)) or (-5,2)) and (-1,2)). Now let's find the hearths: (Kea {2}{2}-b{2} 36-432). ({32} text) (left) (text or 4'sqrt{2}) (right)) and foci are ((((3,),,',',','2'pm (sqrt '{32}) (right)). but just estimate the point: for example, (2,, sqrt {32}) is about 2 (2'5.5), or about 7.5. Note that the verticals and hearths are along the vertical line (x'-3). Here's one where you have to complete the area to be able to schedule the ellipse: Problem: Identify vertices, co-vertices, foci and domain and range for the following ellipses; then graph: \(4{{x}^{2}}+{{y}^{2}}+24x+2y=-33\) Solution: Ellipse Math/Notes \(4{{x}^{2}}+{{y}^{2}}+24x+2y=-33\) \(\displaystyle \begin{array}{c}4{{x}^{2}}+24x+{{y}^{2}}+2y=-33\\4\left({{{x}^{2}}+6x} \right)+{{y}^{2}}+2y=-33\\4\left({{{x}^{2}}+6x+\,\,\underline{{\,\,\,\,\,\,}}\,} \right)+\left({{{y}^{2}}+2y+\,\,\underline{{\,\,\,\,\,\,}}\,} \right)=-33+\,\,\underline{{\,\,\,\,\,\,}}\\4\left({{{x}^{2}}+6x+\color{#2E8B57}{{\underline{{{{{\left(3 \right)}}^{2}}}}}}} \right)+\left({{{y}^{2}}+2y+\color{#2E8B57}{{\underline{{{{{\left(1 \right)}}^{2}}}}}}\,} 3 (справа) {2} слева (1 (справа) {2} 4 x 4 слева (x-подчеркивание{3} справа) {2} слева (подчеркиваю{1}{2} (справа) {2} (x-33-33,36)1-41 (x-3) {2} (справа {2}) end'array)) ((дисплей (фрак) слева (x-3) (справа {4} {2}) {2} {1}-фрак слева (справа) Домен: (слева) (слева) (слева) (слева) (слева) (слева) Положите все (x) и (y) вместе с постоянным термином на другой стороне. Не может быть числа (коэффициента) перед номером (x-{2}) или q («y»{2}), так что учитывайте 4 перед «x» {2}). Не забыл включить его при добавлении к правой стороне. После завершения квадрата, разделить все термины на 4, так что у нас есть 1 справа. Мы будем использовать уравнение: ((отображается (фрак) слева (справа) {2}{2} Слева (x-x) (справа) {2}ББЗБ {2}1) (4)gt;1 (vertical ellipse). We see that the center of the ellipse is at the level (-3,-1), so that we can first build this moment. (for) {2} 4), so (a-2). Since the center is in the center: ((-3,-1), verticals are ((-3,-1-2)) and ((-3, -1'2)) or ((-3,-3)) and (((-3,1)). (BBC {2}) so (b'1). Thus, co-verticals are (-3-1,-1)) and ((-3'1,-1)) or (-4,-1) and ((-2,-1)). Now let's find the hearths: ((to){2} a {2}-b{2}4-1). (c'sqrt{3}), and foci are ((left (No 3,-1), p.p. sqrt{3} (right)). that ellipse 10 across (main length of the axis) and 4 down (small length of the axis). We can also see that the center of the ellipse (left (x, c) is at the level of 4,-3). Since the ellipse is horizontal, we will use the equation ((display style (fracas) on the left (x-h (right) {2} {2} a frac (y-k (right) {2} {2} Connect our values for q(a,'b,', h,', 'text and k', and we get (the (the display) (right) {2} {2} {25} {4} (right) that we didn't need to have the coordinates of the hearth to get the ellipse equation. Solution: Let's schedule the points we have and go from there. Ellipse Mathematics / Domain Notes: (left) Range: (left) (left) (left) (right) Let's first chart the dots we have and we see that the ellipse (only!) is vertical. We know that the endpoints ((-1,-6)) and ((-1,2) are actually vertices rather than co-vertices (since the focus is on the same line). (a-4), so ({2} 1). (c-1) (distance from center to focus), so (with {2} 1). Since {2} {2} ({2}), (b{2}) - {2} - {2}16-115). So (b'sqrt{15}) that we'll need for the domain. Обратите внимание, что со-вертиками будут : ((слева) и ((-1-1-sqrt,-{15},-2)) и ((слева) и (-1'sqrt,{15},-2) (Уравнение эллипса: «(отображается «фрак» слева (x 1) (справа {2}) {2} »{15}» {16} Применение эллипсов очаги эллипсов очень полезны в науке для их отражающих свойств (звуковые волны, световые лучи и ударные волны, в качестве примеров), и даже используются в медицинских приложениях. На самом деле, первый закон Кеплера о планетарном движении гласит, что траектория орбиты планеты моделирует эллипс с Солнцем в одном фокусе, поэтому орбиты астероидов и других тел являются еще одним эллиптической применением. Проблема: Две девушки стоят в шепотом галерея, которая имеет форму полуэллиптической арки. Высота арки составляет 30 футов, а ширина 100 футов. Как далеко от центра комнаты следует разместить шепотом блюда, чтобы девушки могли шептать друг другу? (Whispering dishes place in hearths of the ellipse). Solution: Ellipse Math/Notes We put the center of the arch at (0.0)). Since the width of the arch is 100 feet, a-a-50 (the height of the arch is 30 feet, so (b)) (the height of the arch is only half the shallow axis of the ellipse). Thus, we know that the ellipse equation is text{2500} text{2}{2500} text{2} text{900} text, text{900} text, text{900} text{1}{1} text{1} text). We have to get (c) so we can find hearths, as whisper dishes are on the hearths. Since {2} {2}-{2}), (c{2} ({50} {2})-{30} {2}), so (c.40)... Each girl will stand 40 feet from the center of the room. Problem: The rink is in the shape of an elliptical, and is 150 feet long and 75 feet wide. What is the width of the rink 15 feet from the top? Solution: Ellipse Mathematics / Notes Let's first find the ellipse equation, centered on th (0.0)). Since the main axis is 150 and the small axis is 75, we have (a'75) and (b'37.5). From this, we know that the ellipse equation is {2} ((display) frac'y{75} {75} {2} {2} 37.5) {2} 1) or ((frak x x {2} {5625} fracy {2}1406.251). Equation, we can connect to any (x) value to get value (s) on the ellipse; Since we want the width of the ellipse 15 feet from the top, our value is 75-15 x 60 euros). By connecting 60 for q(x), we get: ((display style (frak) {60} {2} {5625}frac 'y'y'{2} '1406.25'1); Deciding for (y), we get (display style pm surt on the left (1-frac {60} {2} {5625} (right) times 1406.25 pm,,22.5) (take only positive). To get the whole width: The rink width 15 feet from the top is 45 feet. Hyperbole hyperbole kind of looks like two parabola that point at each other, and it's a set of points, the absolute value of the distance differences from the two fixed points (focy) inside the hyperbole is always the same. De-{1} -{2} (right) 2a). This distance, 2a, is called the focal distance of radii, the focal constant or the constant difference, and it turns out that (a) is the distance between the hyperbole center to the top (thus, the distance of focal radius, (2a), the same as the distance between the two verticals). Can you see that in the picture? (put two distances down flat) Note that the two parts of hyperbole are not parabola, and are called branches of hyperbole. The horizontal hyperbole equation (as shown below) that focuses on origin ((left (0.0) (right) is (display style fracx'{2} {2}'a{2}-frac'y'y'{2}. The equation of the converted horizontal hyperbole with the center ((h,k)) is (the frac display on the left (x-h) ({2} on the right) a-{2}-frak on the left (y-k) (right) {2} b {2} 1). is (2a), and it is along the axis of K (x)-axis for horizontal hyperbole. Again, the distance from the center of the hyperbole to the top is (a), so vertices are on the th (left (p. a.0 (right)). (The distance from the center of the hyperbole to the co-top is (b)). Also note where (BH) is not on hyperbole; it is located on the so-called central rectangle (or fundamental rectangle) hyperbole (the diagonals of which are hyperbole imptots). Thus, the conjug axis is located along the axis of the W(g)-axis for horizontal hyperbole, and the co-vertical are at the level (left (0,) , pm b on the right). Asymptots for horizontal hyperbole centered in the left (left (h,k) are (((displaystyle y-k'pm (frak-b on the left) (x-h) (right)). x-h (note that (((displaystyle (frac'sqrt) are the diagonal slopes of the central hyperbole rectangle! - it works for both horizontal and vertical hyperbole! Focuses or hearths always lie within the curves on the main axis, {2} {2} {2} and the distance from the center to the focus is . (I like to remember that you always use another sign for this equation: since ellipses have a plus sign in the equation ((frac x'{2}'a {2} {2} {2})), they have a minus sign in {2}-b'{2}c'{2}) ; since hyperbole have a minus sign in the equation ((frac'x'{2}){2} {2} {2}, they have a plus sign in Plus {2} {2} {2}).) sometimes you will be asked to get hyperbole eccentricity ('display)' which is a measure of how direct or stretched hyperbole. Note also that, as with the ellipse, the focal width (focus chord, or focal rectum) of the ellipse is q (((frac 2'b'{2}); This distance is perpendicular to the main axis that passes through the focus. Here are two different directions of hyperbole and generalized equations for each one: Horizontal Hyperbole (Yap. {2}) in first place) Vertical Hyperbole (Yap. {2}) (right {2} {2} {2}) {2}) General: ((displayed (fracas) left (X-h) (right) {2} {2} (left) (right) {2}b ({2} {2} {2}) : (left (x,k,k) (right) Foci: ((left) (h.s.), ({2} {2} {2}) Verticals: ((((left) (hmm a,), k.k.) Co-Verticals: (left(x,), to:00 b) Length of the cross axis: (2a)) Length of the conjug axis: (2b) asymptots: (Displaystil y-k'pm (frak-b'a left (x-h) (right)) B (left) (0.0) (right) : {2} {2}-frak-xx {2} ({2}1)) : General: (display (frak) left (right) - {2} (right) {2} --frak (x-x) {2} B{2}) {2}) ((left) (x) b, to {2} {2} (right)) Focies: (left (s),,, (right) Verticals: (from left (h,,,,km a) Ko-Vertiches: ((left (Heimb b,): (2a)) Length conjug axis: (2b) asymptots: (((display u-to-pm (frak-a-b'b) left (X-h)) You also, may have to complete be able to schedule hyperbole like we did here for the circle. (And since you should always have one after an equal sign, you may have to divide all the terms into a constant on the right if it's not 1). Remember that in order for a coic to be hyperbole, q (x'{2}) and q (y){2}) ratios must have different marks. Let's put it all together and chart some hyperbole: Problem: Identify center, vertices, foci, and the imptot equation for the following hyperbole; chart: (a) (9'x'{2}-16'y'y'{2}-144'0) (b) Left (y'3 (right) {2} -{4}-frak left (x-2 (right) {2} {36} 1). and then answer the questions. Hyperbole Mathematics/Notes (a) (9'x'{2}-16'y'y'{2} y'y'y'-144'0'), which is (((q)x'x'x'{2} {9} {2}'{16} 1) Domain: (left) Range: (left) Range: ((left) (left) (----------------------------------) (----------------------------------) (----------------------------------) that verticals and foks lie along the horizontal line (y'0) and the length of the transverse axis {2}. {144}--frac'16'y'{2} {144} {144} {144}), or ((frak x {2} {16}- frak {2} {9} 1 {2} {2} {2} {2}). because (x) comes first (horizontal). That would make q(a'{2} 16'), so (a'4'). Since the center of hyperbole is in the center of : ((0.0), vertices are ((4,0)) and ((4,0)). (BBC {2}) so (b'3). Thus, co-verticals are ((0,-3)) and ((0,3)). Now we can build our central rectangle; we use (a) and (b) to create it. Now let's find the hearths: {2} {2} {2} 916.25). Thus(c'5) and foci are (((left) (p.p., 5.0) (right)). Equation asymptots (which pass through the corners of the central rectangle) are (displaystyle y-k'pm fracb'text) (rise) (running) (running) (left) (x-h{3}{4} (right) (Don't forget to use the square root of what is underneath (y) for the numeral slope, and square what is under (x) for the denominator.) b) (display (frak) on the left (right) {2} {4}-frac on the left (x-2) {36} {2} (right) infty , infty (right) Range: ((left) Note that vertices and foci are along the vertical line (x'2), and the length of the cross axis is 4 euros. Teh the conjugation axis is 2b.12). We will use the equation: ((the display (frak) on the left (y-k) {2} {2} (right) Left (x-h) (right) {2}b ({2})) because (y) in the first place (vertical). (for) {2} 4), so (a-2). Since the center is in the center: ((2,-3), vertices are ((((((2,-3-2)) and (((2,-3'2)), or ((((2,-5)) and ((2,-1)). (BBC {2} 36), so (b'6).).. Thus, co-verticals are ((2-6,-3)) and ((((2'6,-3)) or ((4,-3)) and ((8,-3){2} {2} {2}). (c'sqrt'{40}'text) (or 2sqrt {10})) and foci are ((the display (left (2,-3), pm sqrt {40} (right)). k'pm fraca text) (running) (running) (running) (left) (x-h)), or (in the style of the display y'3'pm frac{2}{6} on the left (x-2 (right) or displaystyle y3'pm frac{1}{3} on the left (x-2). (Don't forget to use the square root of what is underneath (y) for the numeral slope, and square what is under (x) for the denominator.) Here's one where you need to complete the area to be able to schedule hyperbole: Problem: Identify center, vertices, hearths, and imptot equations for the following hyperbole; Chart: :(49'y'y'{2}-25'x'{2} 98y-100x-1174'0). Solution: Hyperbola Math/Notes \(49{{y}^{2}}-25{{x}^{2}}+98y-100x+1174=0\) \(\displaystyle \begin{array}{c}49{{y}^{2}}+98y-25{{x}^{2}}-100x=-1174\\49\left({{{y}^{2}}+2y} \right)-25\left({{{x}^{2}}+4x} \right)=-1174\\49\left({{{y}^{2}}+2y+\underline{{\,\,\,\,\,\,}}\,} \right)-25\left({{{x}^{2}}+4x+\underline{{\,\,\,\,\,\,}}\,} \right)=-1174+\underline{{\,\,\,\,\,\,}}\\49\left({{{y}^{2}}+2y+\color{#2E8B57}{{\underline{{{{{\left(1 \right)}}^{2}}}}}}\,} \right)-25\left({{{x}^{2}}+4x+\color{#2E8B57}{{\underline{{{{{\left(2 \right)}}^{2}}}}}}\,} \right)=\\\,-1174+\color{#2E8B57}{{\underline{49{{{\left(1 \right)}}^{2}}-25{{{\left(2 \right)}}^{2}}}}}\\49{{\left({y+1} \right)}^{2}}-25{{\left({x+2} \right)}^{2}}=-1225\end{array}\) \(\displaystyle \frac{{{{{\left({x+2} \right)}}^{2}}}}{{49}}-\frac{{{{{\left({y+1} \right)}}^{2}}}}{{25}}=1\) Domain : (left (---9) Range: (left) (left) Range: ((-------------------) (-------------------)) We need to first complete the square so we can get an equation in the form of hyperbole. positive (we eventually split all terms into -1225). We will use the equation ((shown (frak) on the left (x-h) {2} {2} (right) Left (right) {2}b ({2}1) because in the first place (horizontal hyperbole). (for) {2} 49), so (a'7). Since the center is in the center: ((-2,-1), verticals are ((((2-7,-1)) and (((2'7,-1) or (((-9,-1)) and ((((5,-1)). (BBC {2} 25), so (b'5)... Co-verticals are ((-2,-1-5)) and ((-2,-1'5)) or ((-2,-6)) and ((-2,4)). Now let's find the hearths: {2} {2} {2} 4925.74). ({74}) and foci are ((left (-2'pmsqrt {74}, ,-1, (right)).) are (displaystyle y-k'pm (frac'b'text) (rise) (running) left (x-h) or (displaystyle y'1'pm frac{5}{7} on the left (xx)). Writing hyperbole equations you may be asked to write an equation from a graph or description of hyperbole: Hyperbola Math/Notes Write a hyperbole equation: We see that the center of hyperbole is (left), the cross length of the axis (2aa)), the transverse length of the axis (No2a)) is 6, and the length of the conjugated axis (No (2b)) is also 6. So (a'3) and (b'3)... Since hyperbole is horizontal, we will use the equation ((displayed (fracas) left (x-x) {2} ({2}) - frak left (y-k) (right) {2} {2} Connect our values and we get ((display (frak) left (x-2) (right) {2} {9}-frak (left- 5) {2} {9} Problem: Find the equation hyperbole where the difference in focal radius is 6, and the end points of the conjugation axis are (left (2,8) (left) and (left((2,-2) (right)). That (a) and (b) are. remember that the difference in focal radius is (2a), so (a'3). that is ((left (-2,3) and the length of the small axis (No (2b)) which is 10. (Draw the glasses first if it's hard to see). The ellipse equation then is : ((display style (frak) on the left (x-2 (right) {2} -{9}-frak on the left (u-3 (right) {2} . 25}, 1). Problem: Find the hyperbole equation where one of the vertices is located, in the (left) and the imptota th-2m left{2}{3} (x-3). Let's try a graph of this, as it's hard to say what we know about it! Hyperbole Mathematics / Notes We can see from the equation of amptots, that the center of hyperbole is (left (3,{2} {2} {2} {6} {2} 2) . Graph of this center, and the chart of the top, which is given to see that hyperbole is horizontal. ',1) We also see from the aimptot equation what their slope is ((pm'frac{2}{3}). y-2'pm (frac'b'text) (rise) (rise) (rise is the square root of what is under (y); running is the square root of what is under now we can adjust the proportion for the asymptotic slopes{2}{3} {6} : By cross-multiplying, we get (b'4). Hyperbole equation: ((display (frak) on the left (x-3) {2} {6} {2} --frak (y-2) {2} {4} {2} (left, x-3) {2} ({2} {16} {2} {36}) The use of hyperbole-like ellipses, hyperbole hotspots are very useful in science for their reflective properties, and hyperbolic properties are often used in telescopes. Or a spacecraft passing by the Moon to the planet Venus. Problem: The comet's path (as it approaches the Sun) can be modeled by one branch of hyperbole ({2}-{1096}-frac'x'{2} {41334}) Where the sun is in the spotlight of this part of hyperbole. Solution: Again, it's usually easier to schedule hyperbole and then answer questions. Hyperbola Math/Notes We put the hyperbole center at (0.0) and work only with a positive branch. Hyperbole is vertical, as {2} (yo) goes in front of the x {2}). ((for) {2} 1096) and (b'{2} 41334). (a) Because the sun is in the spotlight, we can use the equation (c{2} {2}) and take the positive value of {2} q (c), which is sqrt109641334. approx 205.99). The Sun coordinates are (left) (0.205.99) (right), where each unit is millions of miles away. b) The closest comet gets the Sun, as when the comet top, which is (left(0, a) (right) or left (0.33.11) (right)). The closest comet hits to the Sun is about (206-33 x 173) million miles. Problem: Two buildings in the shopping complex are shaped like branches of hyperbole (729'x'{2}-1024-y'{2}-746496'0), where they are in feet. How far apart are the buildings in their nearest part? Solution: Let's try this without drawing it, since we know that the nearest point is hyperbole, where vertices, and buildings will be (2a) feet apart. By doing a small algebra (adding 746496 to both sides and then dividing all terms into 746496), we see that the equation in hyperbolic form is (((display style fracx{2}-{1024}-frac'y'{2} {729}1). (a{1024}32 x 2 and 64 feet apart in their nearest part. Problem: Two radar sites track a plane that flies on a hyperbolic trajectory. The second radar facility, located 160 miles east of the first, shows that the aircraft is at an altitude of 100 meters. (Find the hyperbole equation where the plane may be. Solution: Let's first draw a picture and remember that the constant difference for hyperbole is always 2a. Let's create horizontal hyperbole, so we'll use the equation ((display style (frak) on the left (x-h (right){2})-{2}-frak on the left (y-k (right): {2} {2} Hyperbola Math/Notes We know that the distance from the left focus to the plane (hyperbole) is 200 meters, and the distance from the right focus to the plane (hyperbole) is 100 meters. (200-100'2a), or (a'50)... Thus, the For {2} 2500). We also know that (2c) (distance between hearths) (160 euros), so (c'80). Since we {2} ({2} {2} {2}), we can get a {2}-{2} {2} {2} {80} {2} {50} {2} 3,900 euros). In the model, the center of the hyperbole is at (80.0)), so the plane's trajectory follows hyperbole ((the frac display on the left (X-80) (right) {2}{2500}-frac.y ({2} {3900}) Problem: Alpha particles are deflected along hyperbolic pathways,{2}{5} When they are directed to the nuclei of gold atoms. Solution: Let's first draw a picture and make the core the center of hyperbole in W (left). Hyperbole Mathematics / Notes We can put ((0.0)) and aimptota in (y'pm frac{2}{5}x). In the image, we see that the closest hyperbolic alpha particle gets to the nucleus at the level ((0,a);; (a'10). Now we have to find out what (b) ; we have to use the asympto equation to do that. We know that ((display) frac'b'a'frac{2}{5}) (imptot formula for horizontal hyperbole) and that (a'10). By cross-multiplying with q ((display) frac'b '{10}) frac{2}{5}), we get (b'4). So the alpha particle path follows hyperbole.' (display (frac'x'x{2}'{100}-frac'y'{2})) {16} Definition of Conic Sometimes you are given an equation or a description of a conic, and asked to identify a conic. Remember these rules: (x{2}) with others (y)) with others (x {2})) with others (x) (and maybe (i)): parabola (x'{2}) and (I) {2} with the same odds and sign: circle {2})) and I {2} with the same odds and - a sign: hyperbole (x. {2}) and y{2}) with different odds and a sign: x {2}) and me with {2} different odds and - a sign: hyperbole Here are a few examples; I always find it easier to work/schedule {2} these on paper graphs to see What Happens: Identify Conic Solution Identify These Conics: (a) ({2} 64) (b) (6 xx {2}-6-6)yo {2}54) (c) (display style (x'{2}'y'y'y-{2}-4x-y'4)) (x'{2}'y'{2}-4x-y'4)) (4)) (x'{2}'y'y-4x-y'4)) (4)) (x'{2}'y'y-4x-y'4)) (x'{2}'y'y-4x-y'4)) (4)) (x'{2}'y'y-{2}-4x-y'4)) (4)) (x'{2}'y'y-4x-y'4)) (4x-y (d) (x-{2}-2y'x'3) (a) Get all variables on one side {2} {2}: Since the x {2} and I ratios are {2} different from the others, but we have a sign ((, it's an ellipse. (We'd end up with (((the display (frak x x {2}) {16} frac'y '{2} '{4}'1). b) Odds q (x'{2}) and ({2}y)) are the same, but between them there's a (-) sign', that's hyperbole. (We'd end up with (((the display (frak)x {2} '{9}-frac'y'y'{2} '{9}'1). (c) Since the odds of q (x'{2}) and (y)) are the same {2}, We have a circle. We would have to complete the square to get it in the form of x- x (right) {2} (y-k) (right) {2} {2} d) Since we have (x'{2})) with other {2} (y) and (x'{2})) we have a parabola. We would have to complete the square to get it in the (y'a' left (X-h) (right) {2}k) (horizontal) shape. For the following, write the conical equation using the given information: Conic Solution Ellipse with foci (left,-2'sqrt'{13}) (right), left (0.2sqrt {13}) and focal constant 26 Focus Constant is the same as a constant amount, and is defined as (2a) for the ellipse (so(a). Since the pockets are up and down, know it's a vertical ellipse, so we have ((the display (fraq x{2} '{2}'frac'y'{2} '{13}'{2}' 1 {2} {2} {2}). ((((c{2}) on the left (2sqrt {13} (right) {2} 52). B-{2}-{2}-{2} {13} {2}-52-117)... Ellipse equation: (the frak x {2} {117} frak {2} {13} {2} or display (frak) {2} {2} {117} {117} {169}. Asymptot equations are (displaystyle y'pm 3 on the left (x6)-2, and the length of the horizontal conjugation axis is 10 lengths of the horizontal conjugate axis for hyperbole, and for this problem, (2b) Since the conjugation axis is horizontal, we know that we have vertical hyperbole. So we have ((display style (frak) on the left ((y'2) (right) {2} (x 6) {2} - frak (x 6) (right) {2} {5} {2}). that ((display) (frac'a'b) (what is under (y) above what is under (x) (. . . . He was a - he said , he said that I. (frac {5}frac{3}{1}) or a 15 style... Hyperbole equation : ((display (frak) on the left (y'2) (right) {2}){15} {2} Frak on the left (x 6) (right) {2} {5} {2}1). A set of dots that are equidistant from a fixed point ((-3,5) because they are from a fixed line (x'8). that the top is at the level of (display style (left) (frak-38{2},5 (right), text or left (2,5,5)) and parabola horizontal and opens to the left (draw!). that (n)(distance from top to focus) is 8-2.5 x 5{1}.5, so the equation is -kz (right) {2}h) or ((the x'frak display{1} {22} on the left (y-5 (right) {2} . Fotzi's ({5}left)) and the endpoints of the axis are at the point of quet (left) and the endpoints of the axis are at the point K (-2pm sqrt{3}.4) We see that it should be a vertical ellipse, since we are talking about hearths and endpoints, and the hearths are vertical. We see that (b'sqrt{3}) as this is what is added and subtracted horizontally to the center of the ellipse ((-2,4)) (draw it!). We have ((shown frak on the left (x)2) (right) {2} {3} - frak on the left (y-4 (right) ({2} {2}) to get (a), we can use (c {2} {2}) - b {2}), and we know (c{2}) is (left) (sqrt{5} (right) {2} {2} {2} {2}). left) left) (right) {2} {3} frak on the left (y-4 (right) {2} {8}. Learn these rules, and practice, practice, practice! Click for more practice: On a system of nonlinear equations - you're ready! Report this announcement

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