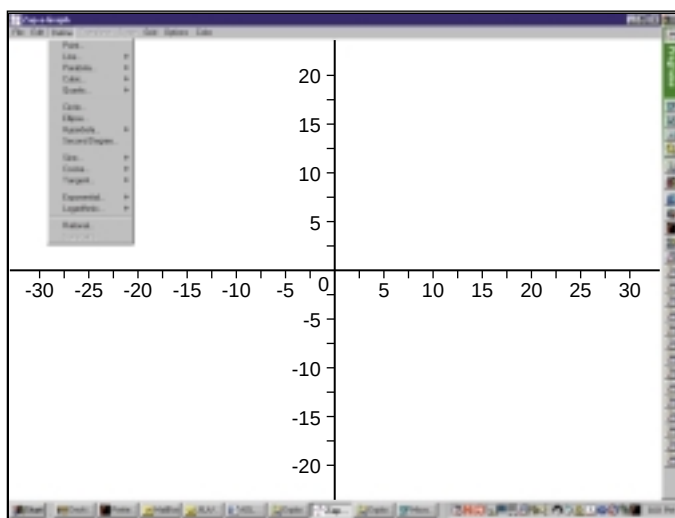




In section 7.3, you graphed circles using a graphing calculator. In several other sections, you also used a graphing calculator for graphing other conics. You can use *Zap-a-Graph* to graph a conic, without having to split the conic into parts, and to see the effect of translating a conic.

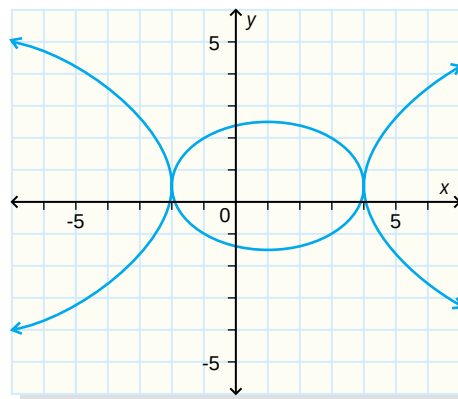
The Define menu is one of the menus listed in the first screen. This menu includes Circle, Ellipse, Hyperbola, and Parabola.



Begin by choosing Parabola.

1. You must then choose a form of the equation for a parabola. You should recognize most of the forms, but choose $n(y + k) = (x + h)^2$.
2. Enter these values: $n = 8$, $h = 2$, and $k = -1$.
3. Before you click Plot, predict the coordinates of the vertex of the parabola. Now click Plot. Did you correctly predict the vertex?
4. Next create an ellipse. Choose Ellipse from the Define menu and enter these values: $h = 2$, $k = 1$, $a = 6$, and $b = 4$. Then Plot. Does the graph confirm what you know about ellipses? You may want to change the scale on the graph by choosing Scale from the Grid menu and then entering different values.
5. Graph, or list the steps for graphing, $\frac{(x - 2)^2}{36} + \frac{(y - 1)^2}{16} = 1$, using a graphing calculator.
6. Graph, or list the steps for graphing, $\frac{(x - 2)^2}{36} + \frac{(y - 1)^2}{16} = 1$, using *Zap-a-Graph*. Compare the graphing methods in this step with those in step 5. Which method requires fewer steps?

7. Next create a hyperbola. Choose **Hyperbola** from the **Define** menu. Then choose the first option and enter the same values as you did for the ellipse in step 4 ($h = 2$, $k = 1$, $a = 6$, and $b = 4$). Plot this hyperbola and the ellipse on the same set of axes. What is common about the shapes? What is different?
8. Before examining the hyperbola in more detail in the next section, experiment with this conic. What values of h and k would produce a hyperbola that is centred at the origin?
9. Choose **Hyperbola** from the **Define** menu. Then choose the first option. Enter these values: $h = 0$, $k = 0$, $a = 4$, and $b = 6$. Describe the graph.
10. Again choose **Hyperbola** from the **Define** menu, but choose the second form for the equation of the hyperbola. Enter the values for h , k , a , and b in step 4 ($h = 2$, $k = 1$, $a = 6$, and $b = 4$), and plot this hyperbola on the same set of axes. What is different about this graph? What is different about the equation?
11. Make a conjecture about the relationships between the equation of a hyperbola and its graph, referring to the x -intercepts, the y -intercepts, and the direction of the axis of symmetry. Test your conjectures using *Zap-a-Graph*.



step 7

Practice 7.8U

1. For each equation,
 - i. determine the type of conic
 - ii. describe the graph
 - iii. use graphing technology to graph the conic
 - iv. verify your description
 - (a) $y = x^2 + 4$
 - (b) $x^2 + y^2 = 9$
 - (c) $4x^2 + y^2 = 64$
 - (d) $\frac{(x-2)^2}{9} + \frac{(y+1)^2}{16} = 1$
 - (e) $(x+3)^2 + y^2 = 4$
 - (f) $(x-2)^2 = 2(y+1)$
2. (a) Determine the equation of the ellipse with x -intercepts ± 3 and y -intercepts ± 2 .
 (b) Graph your equation.
 (c) Verify that the graph has the given x - and y -intercepts.
3. For the equation $x^2 = 2y$,
 - i. determine the new equation for each translation
 - ii. graph the new equation in a different colour
 - iii. determine if the new equation is correct
 - (a) translation of 3 units left and 2 units up
 - (b) translation of 1 unit right and 1 unit down
 - (c) translation of 2 units right and 3 units up
 - (d) translation of 1 unit left and 5 units down