Tech Support

This lesson can be supported by technology in a variety of ways. Minimally, students should be allowed to use whatever calculator they want to do the arithmetic. There is nothing that will make the lesson seem less relevant than artificially ruling out the use of calculators. In the real world, problems of this sort involve electronic calculation. No one in any institution calculates by hand.

Among other possibilities we have electronic graphing, spreadsheets, and computer/calculator algebra systems.
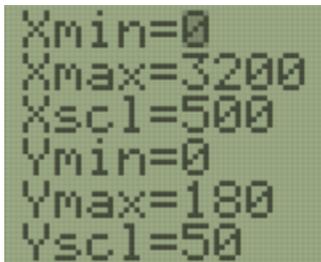
TI-83/84 Graphing Calculator

Y=

For Y3, a piecewise function, use this trick:
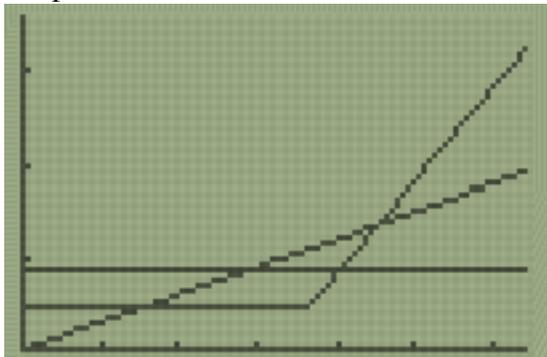
    (x<1800)22+(x≥1800)(22+(x-1800)0.1)

The inequalities are evaluated as 0 if false, 1 if true. Take some time to explain this, as it is far from transparent!

Window

Instead of giving this window, you may encourage group discussion of what would make a good window, and/or lead a class discussion of that question.

Graph

Discuss which line represents which plan. Use 2nd Calc Intersect to find the break-even points.

2nd Table

$\triangle Tbl=60$

Scroll down and left/right to find the break-even points.

Google Spreadsheets

f_x | =60*A2

	A	B
1	Hours	Minutes
2	2	=60*A2
	50	3000

To copy the formula to the cells below B2, just press Enter, click once on B2, and drag the little square at its bottom right downwards.

A	B
Hours	Minutes
2	120
50	3000

To enter the formula for Plan C, use this format:

Syntax: IF(test, then_value, otherwise_value)

Specifies a logical test to be performed. Test is any value or expression that can be TRUE or FALSE. Then_value (optional) is the value that is returned if the logical test is TRUE.

Plan C	
=if(B2<1800,22,22+.1*(B2-1800))	

Comparing Cell Phone Plans

Hours	Minutes	Plan A	Plan B	Plan C
2	120	44	3.6	22
50	3000	44	90	142
15	900	44	27	22

To get a more general table, the "hours" column can be jump-started with the values 1 and 2, then select both cells, grab the bottom-right little square, and drag downwards.
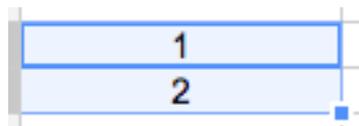
Other spreadsheets, such as Excel and Numbers work basically the same way.

Computer/Calculator Algebra Systems

You can download a free computer algebra system from the National Council of Teachers of Math. (Go to http://www.nctm.org/resources/high.aspx and click on "Core Math Tools" in the sidebar.)

To solve the equations, use this format: solve(22=.03*m,m) The "comma, m" at the end tells the software to solve the equation for m. The same format works on the TI-89 calculator.

▼ solve(22=.03*m,m)
$$m = 733.3333$$
▼ solve(44=22+0.1*(m-1800),m)
$$m = 2,020.0$$

Simply entering 22=.03*m in Wolfram Alpha http://www.wolframalpha.com/ yields the solution, as well as a graph of the two functions.