Solution

Possible approach:

Convert hours to minutes for each customer (multiply by 60.)

Figure out what each would owe under each plan, perhaps presenting the results in a table:

	Minutes	Plan A	Plan B	Plan C
Silent Sam	120	\$44.00	\$3.60	\$22.00
Chatty Cathy	3000	\$44.00	\$90.00	\$142.00
Mathy Mary	900	\$44.00	\$27.00	\$22.00

After working out these examples, it becomes clear (especially with the help of a graph) to see that for few minutes, Plan B is best. For many minutes, Plan A is best. And there is a zone in between for which Plan C is best.

One can use technology to purse the general question, but that requires knowing how to describe the plans with algebraic notation. If m is the number of minutes, and the equations are in dollars:

$A=44$

$B=0.03m$

If $m \leq 1800$, $C=22$

If $m>1800$, $C=22+0.1(m-1800)$

Of course, the last equation is the trickiest to find:

$(m-1800)$ represents the number of minutes beyond 1800.

Multiply that by 0.1 (ten cents), and add the base cost of \$22.

Here are three ways to find the break-even points:

◊ Use trial and error with different numbers of minutes to figure out when Plan C becomes preferable to Plan B, and when Plan A becomes preferable to Plan C.

◊ Use software to solve the equations graphically (see *Tech Support)*

◊ Solve the two equations (“manually” or with the help of CAS):

$.03m=22$ (break-even point for B and C)

$22+0.1(m-1800)=44$ (break-even point for C and A).

The solutions are, respectively: 733 minutes (approximately), and 2,020 minutes. In hours: 12 hours 13 minutes (approximately), and 33 hours 40 minutes.

