8.1 Activity

Text messaging using cell phones and similar mobile devices is the most widely used data application in the world. The first phone text message was sent in 1992. In less than 20 years, there were over 2 billion users of text messaging worldwide.

Most people with mobile communications devices buy a voice plan that includes text messaging. But there are many people that want only text messaging capability. These people may buy a *data only plan* from a service provider.

1. One company has a plan that costs \$5 per month for up to 200 messages sent or received. Each additional message costs \$0.10.
   a. Under this plan, how much would you pay if you send or receive 125 messages in one month?
   b. How much would you pay for 215 messages in one month?
   c. Write an equation that gives the total cost C_1 for a month with n messages, if n is greater than 200.

\$5

\$5 + .10(15) = \$6.50

$C_1 = 5 + .10(n - 200)$

2. Another company also charges \$5 per month but allows up to 250 messages. Each message above 250 costs \$0.20. Write an equation that gives the total cost C_2 for a month with n messages, if n is greater than 250.

$C_2 = 5 + .20(n - 250)$

3. Compare the costs of the two plans for a month in which 150 messages are used.

They both cost \$5.

4. Compare the costs of the two plans for a month in which 230 messages are used.

$C_1 = 5 + .10(30) = \$8$

$C_2 = \$5$

} Plan 2 is \$3 cheaper than Plan 1

5. Compare the costs of the two plans for a month in which the number of messages used is (a) 280 messages and (b) 350 messages.

a) 280 messages

$C_1 = 5 + .10(80) = \$13$

$C_2 = 5 + .20(30) = \$11$

Plan 2 is \$2 cheaper than Plan 1

b) 350 messages

$C_1 = 5 + .10(150) = \$20$

$C_2 = 5 + .20(100) = \$25$

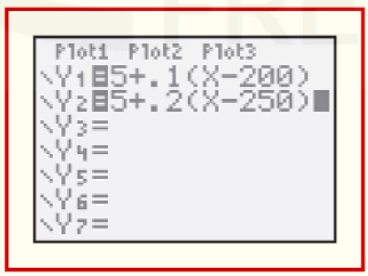
Plan 1 is \$5 cheaper than Plan 2

6. Your answers to Question 5, Parts (a) and (b) suggest that there may be some number of messages between 280 and 350 for which both plans cost the same. Explain why.

For 280 messages. Plan 2 was cheaper than Plan 1.

For 350 messages, Plan 1 was cheaper than Plan 2. This means that somewhere between 280 and 350 messages the plans must cost the same amount; however, it may not be a whole # of messages.

7. One way to find if there is a value of n for which the costs of both plans are equal is to use a table. Enter both of your cost equations as functions on the function screen **Y=** of your calculator. Let **Y1** represent the cost of the first plan, C_1. Let **Y2** represent the cost of the second plan, C_2.



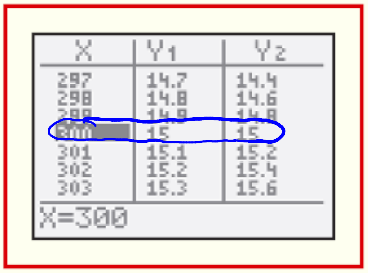
$Y_1 = 5 + .10(n - 200)$

$Y_2 = 5 + .20(n - 250)$

8. Use the Table Setup screen **[TBLSET]** to start a table at 280 messages with an increment **ΔTbl** of 1 message. Both the independent and dependent variables should be set to **Auto**.

9. Search the **[TABLE]** screen to find the number of messages **X** that results in the same cost for both plans, **Y1** and **Y2**. This number is the value of n. What is the value of n? $n = 300$ messages

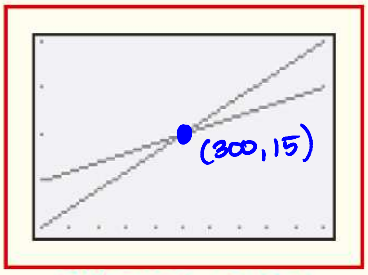
10. Substitute your answer to Question 9 into each of your cost equations and evaluate them to find C_1 and C_2.



$C_1 = 5 + .10(100) = \$15$

$C_2 = 5 + .20(50) = \$10$

11. Graph both equations using a window large enough to include your answer to Question 9. Describe the result.



[250, 350] × [5, 25]

12. Summarize your results by describing the intervals of messaging for which (a) both plans have equal costs, (b) Plan 2 is cheaper than Plan 1, and (c) Plan 1 is cheaper than Plan 2.

a) Both plans cost the same ($5) from 0 to 200 messages and for 300 messages ($15)

b) Plan 2 is cheaper than Plan 1 between 200 and 300 messages.

c) Plan 1 is cheaper than Plan 2 for more than 300 messages.

13. Suppose a friend wants to sign up for an inexpensive data-only plan and asks your advice on which of these two plans is better. How would you answer?

- I would tell my friend that it depends on the # of messages she usually sends... See #12.

- Overall, plan 2 is better since you get more messages for $5, but if she is frequently going to go over 300 messages, then she should get Plan #1.