

Open-Ended Template

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Grade Level: 3-5

Content Area: Algebra and Functions

PA Standard(s) addressed:

2.8.5.A--recognize, reproduce, extend, create, and describe patterns, sequences and relationships verbally, numerically, symbolically, and graphically, using a variety of materials.

2.8.5.F--describe a realistic situation using information given in equations, inequalities, tables, or graphs.

NCTM Standard(s) addressed: --understand patterns, relations, and functions; use mathematical models to represent and understand quantitative relationships; analyze change in various contexts.

Problem Name: **Cell Phone Competition**

Problem:

Cell phone companies send out monthly bills that show a monthly fee and a per call fee.

Cell phone company, **Budget**, charges a monthly fee of \$10.00. In addition you will pay \$0.10 a call.

Cell phone company, **Save-a-Buck**, charges a monthly fee of \$7.50. In addition you will pay \$0.20 a call.

A -What would you pay each company for a month in which you made 20 calls?

Budget - _____

Save-a-Buck - _____

B -What would you pay each company for a month in which you made 30 calls?

Budget - _____

Save-a-Buck - _____

C - You are currently using **Save-a-Buck**. How many phone calls per month would you need to make for **Budget** to become less expensive to use?

Directions:

Show all work that you did to arrive at your answers.

Explain how you calculated your answers.

Problem Solution(s):

A - **Budget**— Answer is \$**12.00**.

Explanation - The monthly charge = \$10.00 (monthly fee) + \$2.00 (20 X \$0.10 per call fee).

Save-a-Buck— Answer is \$**11.50**.

Explanation – The monthly charge = \$7.50 (monthly fee) + \$4.00 (20 X \$0.20 per call fee).

B - **Budget**— Answer is \$**13.00**.

Explanation - The monthly charge = \$10.00 (monthly fee) + \$3.00 (30 X \$0.10 per call fee).

Save-a-Buck— Answer is \$**13.50**.

Explanation – The monthly charge = \$7.50 (monthly fee) + \$6.00 (30 X \$0.20 per call fee).

C - At 26 calls, **Budget** becomes less expensive. At 25 calls, both companies will send out bills that are \$12.50.

Explanation – Students will indicate the number of phone calls at which both companies charge an equal amount. They will indicate that after 25 calls they should change companies.

Possible problem solving strategies include:

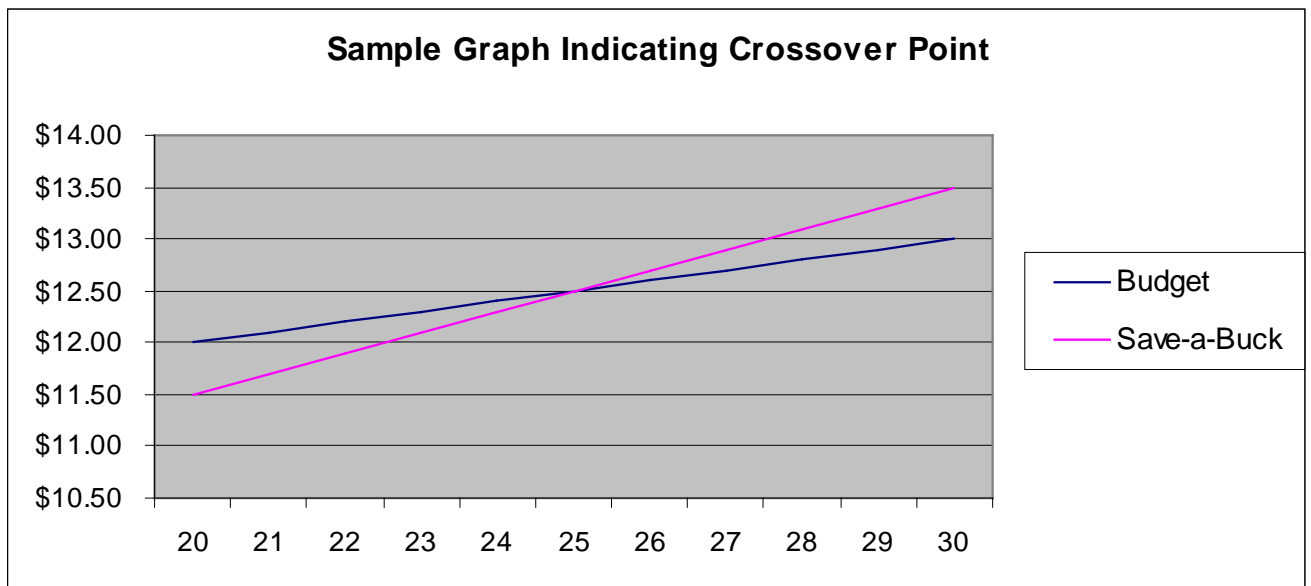
Table

Monthly Bills for a Range of 20-30 Calls

Number of Calls	20	21	22	23	24	25	26	27	28	29	30
Budget \$10 +\$0.10 a call	12.00	12.10	12.20	12.30	12.40	12.50	12.60	12.70	12.80	12.90	13.00
Save-a-Buck \$7.50+\$0.20 a call	11.50	11.70	11.90	12.10	12.30	12.50	12.70	12.90	13.10	13.30	13.50

Graph

Monthly
Charge



Number of Calls

Specific Rubric:

5. Advanced Understanding:

4 computation answers are correct in Part A and B, correct decision is made in Part C.
All responses are supported by complete explanations.

4. Satisfactory Understanding:

4 computation answers are correct in Part A and B, correct decision is made in Part C. 4 of the responses are supported by complete explanations.

3. Almost Satisfactory Understanding:

3 computation answers in Part A and B are correct, decision in Part C is correct.
Partial explanations are given.

OR

4 computation answers in Part A and B are correct. The explanations are weak.
Decision in Part C is incorrect.

2. Partial Understanding:

2 computation answers in Part A and B are correct. Little or no explanations are given. Decision in Part C is incorrect.

1. Minimal Understanding:

1 computation answer in Part A or B is correct. Little or no explanation is given.
Decision in Part C is incorrect.

0. No Understanding:

No correct computation answers in Part A or B. Decision in Part C is incorrect or not attempted.