

**A.A.7: Break Even: Analyze and solve verbal problems whose solution requires solving systems of linear equations in two variables**

- 1 A hotel charges \$20 for the use of its dining room and \$2.50 a plate for each dinner. An association gives a dinner and charges \$3 a plate but invites four nonpaying guests. If each person has one plate, how many paying persons must attend for the association to collect the exact amount needed to pay the hotel?

1) 60  
2) 44  
3) 40  
4) 20

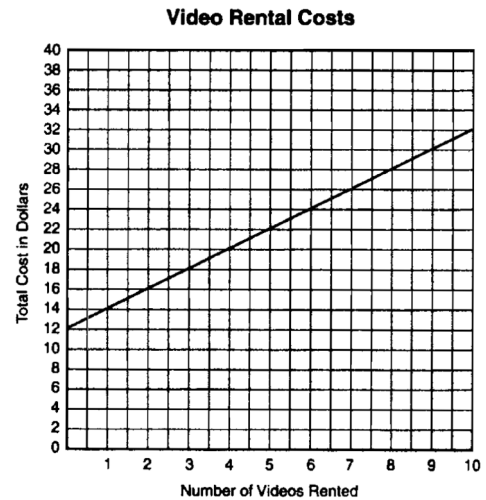
- 2 A cellular telephone company has two plans. Plan A charges \$11 a month and \$0.21 per minute. Plan B charges \$20 a month and \$0.10 per minute. After how much time, to the *nearest minute*, will the cost of plan A be equal to the cost of plan B?

1) 1 hr 22 min  
2) 1 hr 36 min  
3) 81 hr 8 min  
4) 81 hr 48 min

- 3 Juan has a cellular phone that costs \$12.95 per month plus 25¢ per minute for each call. Tiffany has a cellular phone that costs \$14.95 per month plus 15¢ per minute for each call. For what number of minutes do the two plans cost the same?

- 4 The Excel Cable Company has a monthly fee of \$32.00 and an additional charge of \$8.00 for each premium channel. The Best Cable Company has a monthly fee of \$26.00 and an additional charge of \$10.00 for each premium channel. The Horton family is deciding which of these two cable companies to subscribe to. For what number of premium channels will the total monthly subscription fee for the Excel and Best Cable companies be the same? The Horton family decides to subscribe to 2 premium channels for a period of one year. Which cable company should they subscribe to in order to spend less money? How much money will the Hortons save in one year by using the less expensive company?

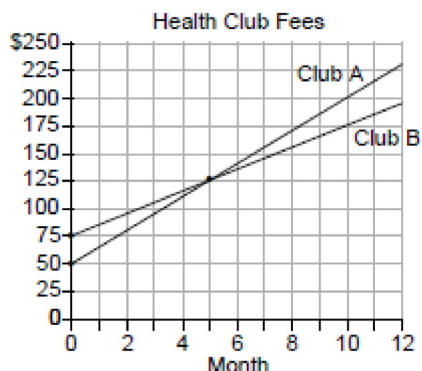
- 5 Two video rental clubs offer two different rental fee plans: Club A charges \$12 for membership and \$2 for each rented video. Club B has a \$4 membership fee and charges \$4 for each rented video. The graph below represents the total cost of renting videos from Club A.



(a) On the same set of  $xy$ -axes, draw a line to represent the total cost of renting videos from Club B.

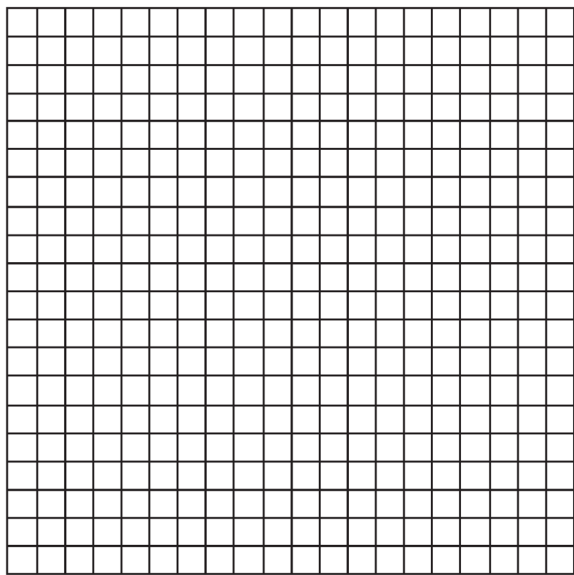
(b) For what number of video rentals is it less expensive to belong to Club A? Explain how you arrived at your answer.

- 6 Two health clubs offer different membership plans. The graph below represents the total cost of belonging to Club *A* and Club *B* for one year.

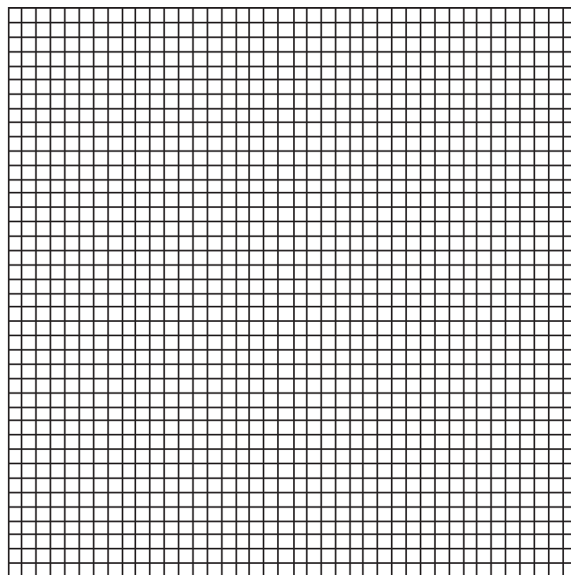


If the yearly cost includes a membership fee plus a monthly charge, what is the membership fee for Club *A*? What is the number of the month when the total cost is the same for both clubs? What is the total cost for Club *A* when both plans are the same? What is the monthly charge for Club *B*?

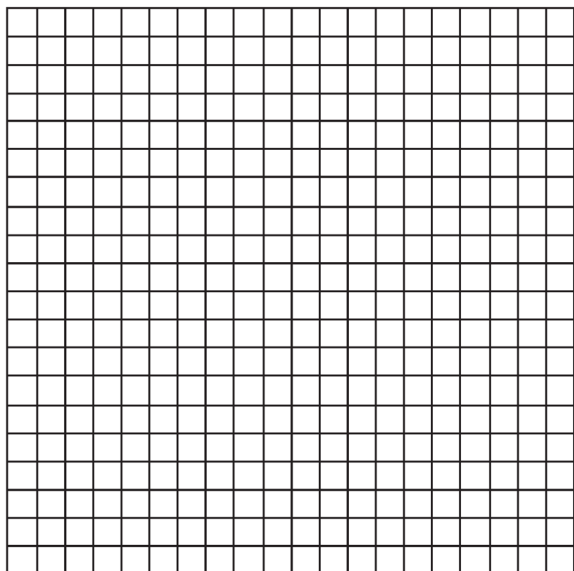
- 7 Currently, Tyrone has \$60 and his sister has \$135. Both get an allowance of \$5 each week. Tyrone decides to save his entire allowance, but his sister spends all of hers each week plus an additional \$10 each week. After how many weeks will they each have the same amount of money? [The use of the grid is optional.]



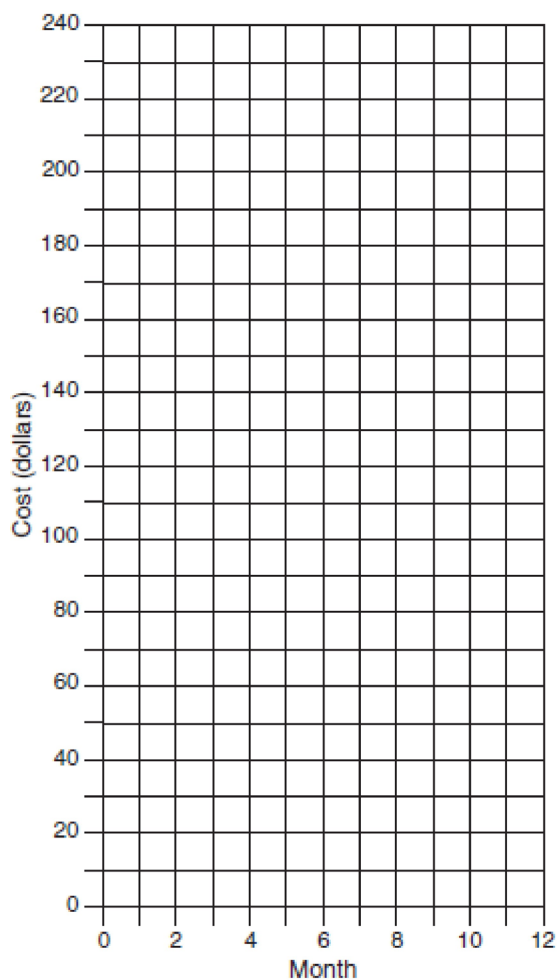
- 8 The senior class is sponsoring a dance. The cost of a student disk jockey is \$40, and tickets sell for \$2 each. Write a linear equation and, on the accompanying grid, graph the equation to represent the relationship between the number of tickets sold and the profit from the dance. Then find how many tickets must be sold to break even.



- 9 Island Rent-a-Car charges a car rental fee of \$40 plus \$5 per hour or fraction of an hour. Wayne's Wheels charges a car rental fee of \$25 plus \$7.50 per hour or fraction of an hour. Under what conditions does it cost *less* to rent from Island Rent-a-Car? [The use of the accompanying grid is optional.]



- 10 At Ron's Rental, a person can rent a big-screen television for \$10 a month plus a one-time "wear-and-tear" fee of \$100. At Josie's Rental, the charge is \$20 a month and an additional charge of \$20 for delivery with no "wear-and-tear" fee.
- a* If  $c$  equals the cost, write one equation representing the cost of the rental for  $m$  months at Ron's Rental and one equation representing the cost of the rental for  $m$  months at Josie's Rental.
- b* On the accompanying grid, graph and label *each* equation.
- c* From your graph, determine in which month Josie's cost will equal Ron's cost.



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**Answer Section**

1 ANS: 1

$$3p = 20 + 2.50(p + 4)$$

$$3p = 30 + 2.50p$$

$$0.50p = 30$$

$$p = 60$$

PTS: 2 REF: 060117a

2 ANS: 1

$$0.21m + 11 = 0.10m + 20$$

$$0.11m = 9$$

$$m = 81.82 = 1 \text{ hr } 22 \text{ min}$$

PTS: 2 REF: 080114b

3 ANS:

$$12.95 + .25m = 14.95 + .15m$$

$$20. \quad .10m = 2$$

$$m = 20$$

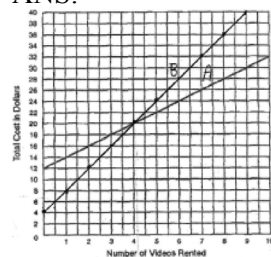
PTS: 3 REF: 010130a

4 ANS:

3, Best; 24. Best,  $26 + 10(2) = 46$ . Excel,  $32 + 8(2) = 48$ . The Hortons should subscribe to Best. Since Best is \$2/month cheaper, the Hortons will save \$24 in one year.

PTS: 4 REF: 010035a

5 ANS:



. It is less expensive to rent 5 or more videos from Club A, as indicated from the graph above.

PTS: 4 REF: spring9831a

6 ANS:

$$15x + 50 = 10x + 75$$

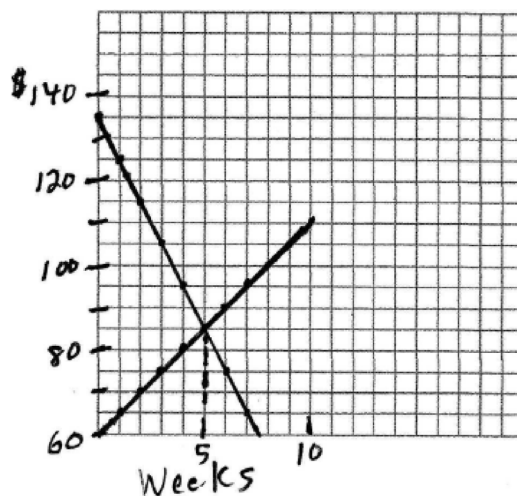
$$\$50, 5, \$125, \$10. \quad 5x = 25 \quad . \quad 15(5) + 50 = 125$$

$$x = 5$$

PTS: 4

REF: 089935a

7 ANS:



$$60 + 5x = 135 - 10x$$

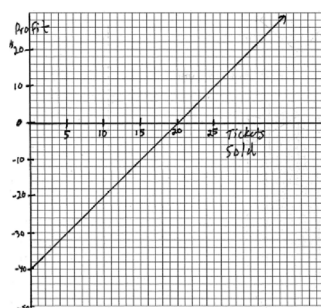
$$5. \quad 15x = 75 \quad .$$

$$x = 5$$

PTS: 3

REF: 010329a

8 ANS:

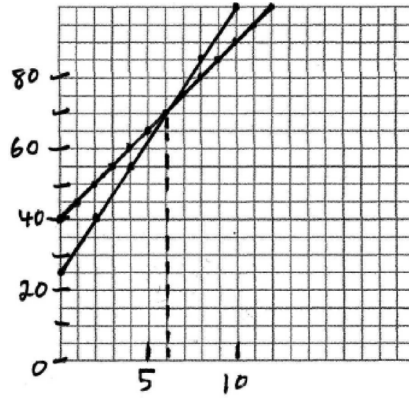


$$y = 2x - 40. \quad 20$$

PTS: 4

REF: 060335a

9 ANS:



$$25 + 7.5h > 40 + 5h$$

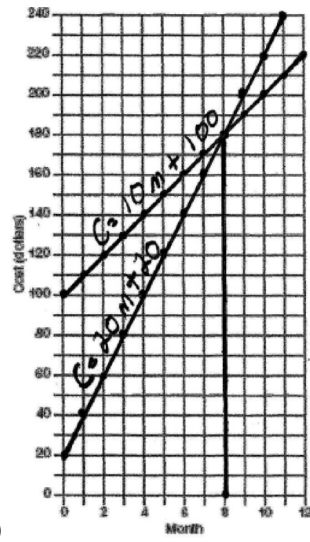
$$h > 6. \quad 2.5h > 15$$

$$h > 6$$

PTS: 2

REF: 060226b

10 ANS:



a) Ron:  $c = 10m + 100$ , Josie:  $c = 20m + 20$ ; b)

c) 8

PTS: 4

REF: 060232a