WARM UP - use graph paper

e.g., *Problem*: A library is buying both hardcover and paperback books. It plans to purchase at most four times as many paperbacks as hardcover books. Altogether the plan is to purchase no fewer than 200 books. Hardcover books average $35.75 in cost while paperbacks average $12.20. How can the library minimize its costs?

Solution: Let x represent the number of hardcover books. Let y represent the number of paperback books. Let C represent the total cost of the books.

Objective function to minimize: $C = 35.75x + 12.2y$

Constraints and restrictions:

$\{(x, y) \mid x + y \geq 200, x \in W, y \in W\}$

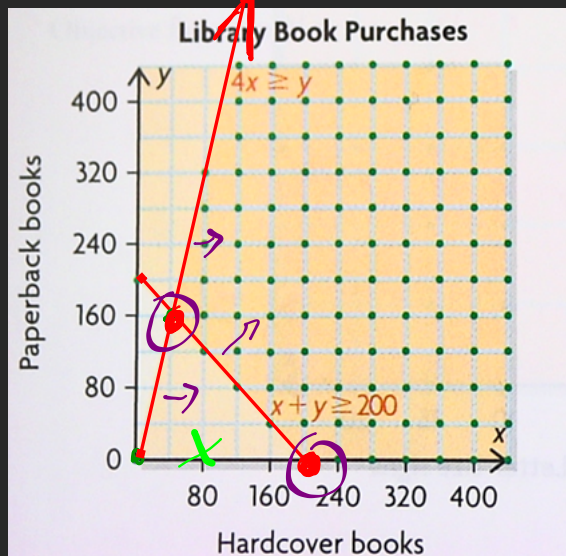$\{(x, y) \mid 4x \geq y, x \in W, y \in W\}$

Handwritten annotations:

$y \leq 4x$ min

Vertex | C

(40, 160)
(200, 0)   Cost

35.75*40+12.2*16
35.75*200   3382
7150

$\rightarrow y \leq 4x$

Test (80, 0)

LS ≤ RS

0 | 4(80)
≤ 320
yes

$y = 4x$

x	y
0	0
100	400
50	200
40	160

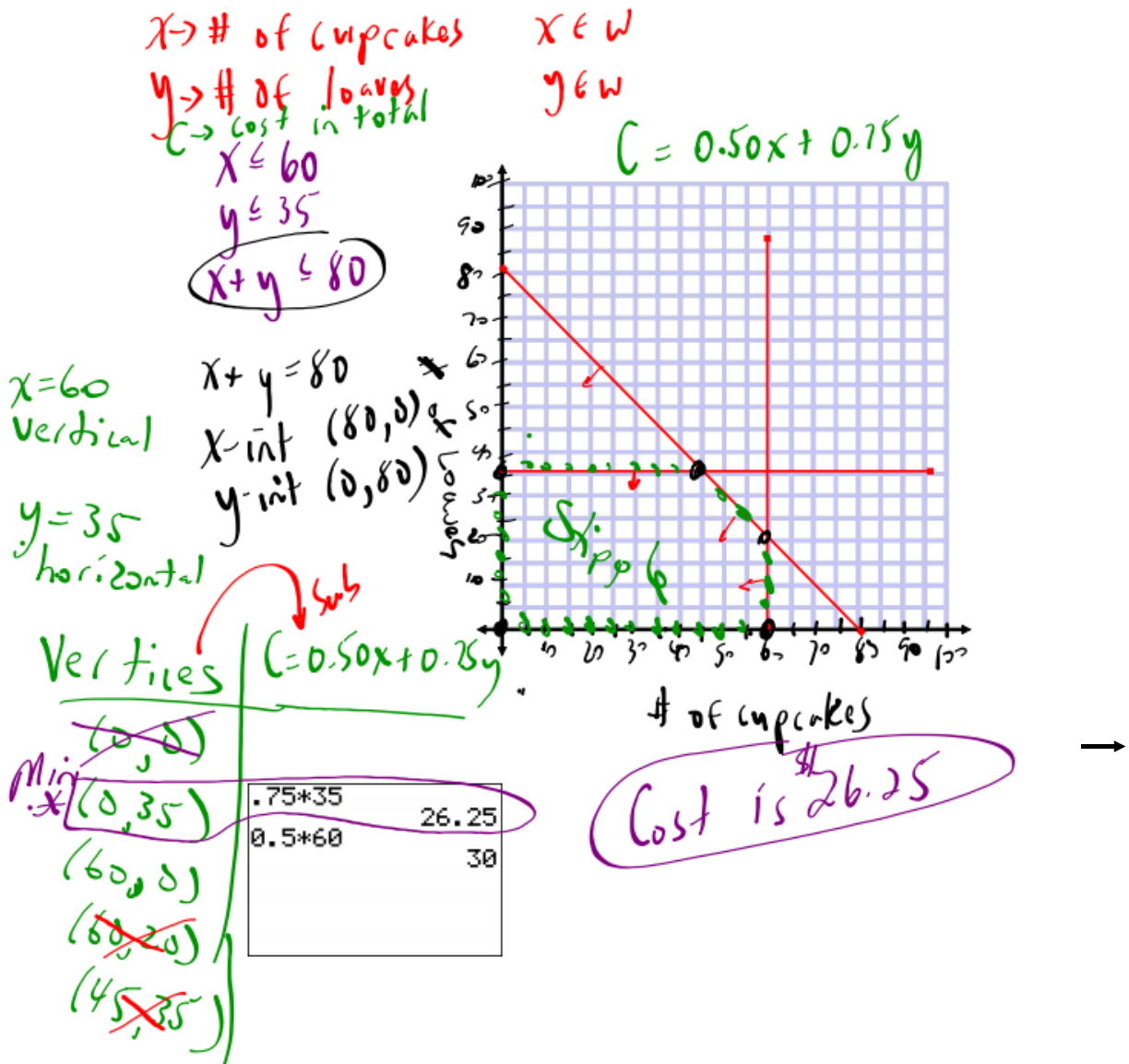**Library Book Purchases**

$4x \geq y$

$x + y \geq 200$

The library should purchase 40 hardcover books and 160 paperback books, for a total cost of $3382.00.

ONE MORE...

Malia and Lainey are baking cupcakes and banana mini-loaves to sell at a school fundraiser...

- No more than 60 cupcakes and 35 mini-loaves can be made each day.
- Malia and Lainey can make no more than 80 baked goods, in total, each day.
- It costs $0.50 to make a cupcake and $0.75 to make a mini-loaf.

Determine the minimum cost to produce the baked goods.

$x \rightarrow$ # of cupcakes　　$x \in W$

$y \rightarrow$ # of loaves　　$y \in W$

$c \rightarrow$ cost in total

$x \le 60$

$y \le 35$

$\boxed{x + y \le 80}$

$C = 0.50x + 0.75y$

$x = 60$ Vertical

$x + y = 80$

x-int $(80, 0)$

y-int $(0, 80)$

$y = 35$ horizontal

Sub

Vertices $| \ (C = 0.50x + 0.75y)$

Min:

~~(0, 0)~~

$\times (0, 35)$

$(60, 0)$

~~(60, 20)~~

~~(45, 35)~~

.75*35   26.25

0.5*60   30

# of cupcakes

Cost is $26.25

HOMEWORK: Test is on THURSDAY!!!

*** CHECK AND CORRECT your quiz...

Review/Practice Questions...

- p. 239: Mid-Chapter Review (Frequently Asked Questions)
- p. 241: Mid-Chapter Practice Questions
- p. 266: Chapter Review (Frequently Asked Questions)
- p. 267: Chapter Practice Questions
- p. 265: Chapter Self-Test (Do this AFTER you practice)

Self Test ④

4. A transportation company leases vehicles.
   - It has 10-passenger vans and 16-passenger minibuses to lease.
   - At most, 5 minibuses are available to lease.
   - There are 120 or fewer people to be transported.
   - Each minibus plus a driver costs $730 to lease, and each van plus a driver costs $550.

   What combination of vans and minibuses will allow the transportation company to maximize the value of the leases? What will the maximum value be? How many people can be transported?

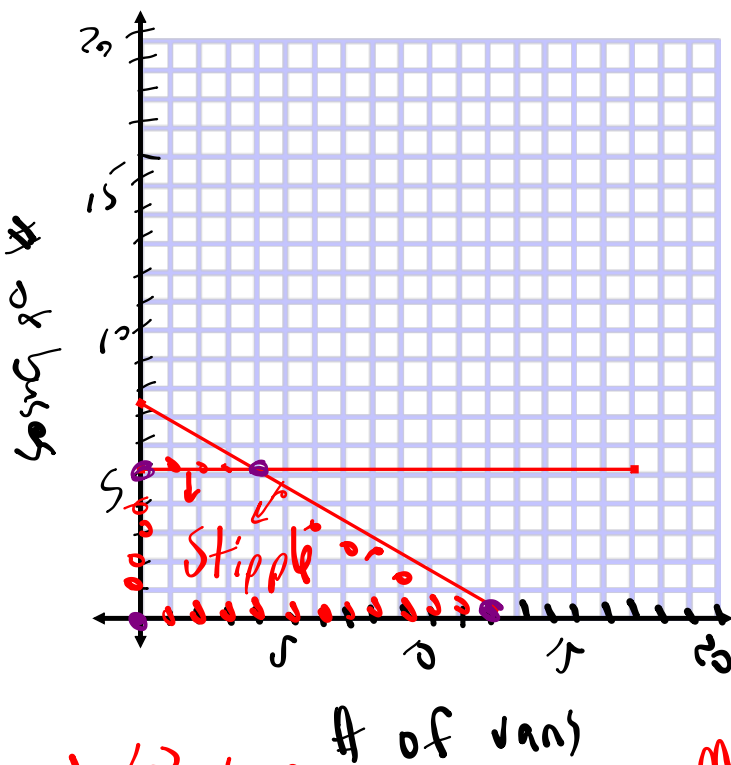$x \to$ # of vans
$y \to$ # of buses
$x \in W$ $y \in W$

$y \le 5$
$10x + 16y \le 120$ Graph

$C = 550x + 730y$

$10x + 16y = 120$

x int: $\dfrac{10x}{10} = \dfrac{120}{10}$
$x = 12$
$(12, 0)$

y int: $\dfrac{16y}{16} = \dfrac{120}{16}$
$y = 7.5$
$(0, 7.5)$

Stipple

# of vans (x-axis label)
# of buses (y-axis label)

Vertices | $C = 550x + 730y$

~~(0,0)~~
(0,5) | 3650
Max (12,0) | 6600
(4,5) | 5850

a) 12 vans
b) $6600
c) 120 people