Learning Target: I can graph systems of linear inequalities to find a feasible region.

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1.3B Graphing Systems of Linear Inequalities to Find a Feasible Region

Section 1.3B

1) Geneva is packaging steaks to sell wholesale to local stores. Each package will contain a combination of round steaks and T-bone steaks. The package will hold no more than 12 steaks. The round steaks cost $4 each and the T-bone steaks cost $10 each. The total price of each package must be at least $80.

a) A possible combination of steaks that will fit in the package is 2 round steaks and 7 T-bone steaks because there can be at most 12 steaks in a package and $2 + 7 \leq 12$.

Give three more combinations of steaks that will fit in the package. Calculate the total ~~cost~~ **amount of steaks** for each combination to verify the accuracy. Record your thinking.

(3,7)   3 round, 7 T-bone $3+7 \leq 12$ ✓
(1,1)   1 round, 1 T-bone $1+1 \leq 12$ ✓
(2,2)   2 round, 2 T-bone $2+2 \leq 12$ ✓

b) **Write an inequality** showing **the number** of round steaks (R) and the number of T-bone steaks (T) totals no more than 12.

$R + T \leq 12$

R	T
12	0
0	12

$R + 0 \leq 12$
$0 + T \leq 12$ page 20

c) **Plot the ordered pairs** you found as possible combinations for the number of round steaks and the number of T-Bone steak that could be packaged together (3,7) (1,1). **Graph the inequality**. Be sure to identify (2,2) the x- and y-intercepts of the graph of the inequality on the grid.

Then **shade the region** containing the solutions. $0+0 \leq 12$ True

d) A possible number of round steaks and T-bone steaks that will total at least $80 is 2 round steaks and 7 T-bone steaks because Mistake
$4(2 round stk) + $10(7 T-Bone stk) \geq $80.

Give three more combinations of steaks that will total at least $80.

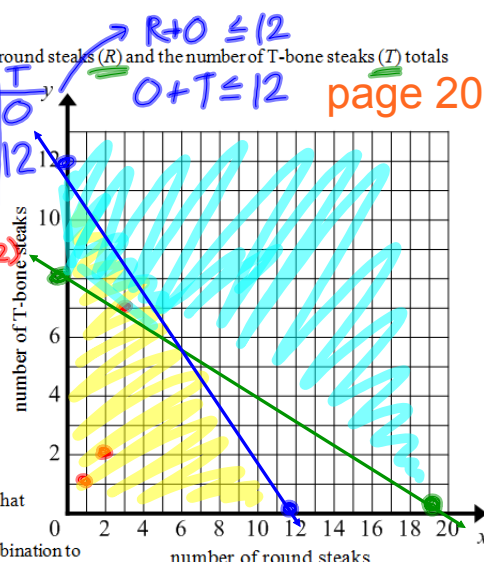Calculate the total cost for each combination to verify the accuracy. Record your thinking.

number of T-bone steaks
number of round steaks

$4 $10
1 round, 9 T-bone
$4(1) + $10(9) \geq $80 ✓

3 round, 8 T-bone
$4(3) + $10(8) \geq $80 ✓

3 round, 10 T-bone
$4(3) + $10(10) \geq $80 ✓

e) Using the pattern you developed in **(d)** above, write an inequality showing the **total cost** of the round steaks ($4 (R)) and the T-bone steaks (($10) (T)) in each package is at least $80. $\$4R + \$10T \geq \$80$

f) Use *x*- and *y*-intercepts to **graph the inequality** from part **e)** on the same grid above and **shade the region** containing the solutions.

g) **Name two coordinate pairs** that are solutions to **both** inequalities.
Calculate the total cost for each combination to verify the accuracy. Record your thinking.
AND the total amount of steaks in the package!

f)

R	T
20	0
0	8

$4R + 10(0) = 80$
$\dfrac{4R}{4} = \dfrac{80}{4}$
$R = 20$

To shade:
Test (0,0) → $4(0) + 10(0) \geq 80$
$0 \geq 80$ FALSE!

h) The over-lapping shaded region for a system of inequalities is called the **feasible region.** What does the feasible region represent in this packaging situation?

solution!

The feasible region represents when the package has at most 12 steaks and when the cost is greater than or equal to $80