Section 2 – Topic 8 Solving Linear Systems Using Substitution

We can use the substitution method to solve and understand the solutions to a real-world problem.

Let's Practice!

- 1. *U-Haul* charges \$25 per day for their small truck rental plus an additional \$0.25 per mile. *Ryder* charges \$40 plus \$0.10 per mile. Let x represent the number of miles driven, f(x) represent *U-Haul*'s total charge, and g(x) represent *Ryder*'s total charge.
 - a. Write expressions for f(x) and g(x) that represent each company's rental charges.

each company's rental charges.

$$f(x) = 25 + .25x$$
 $g(x) = 40 + .10x$

b)
$$40+.10x = 25+.25x$$
 $-.10x$
 $40=25+.15x$
 $15=.15x$
 $15=.15x$
 $15=.15$
 $x=100$
 $x=100$

At 100 miles, the cost is the same.

- 2. The freshman and sophomore classes are raising money for Relay for Life. The freshman class purchased 500 gourmet flavored lollipops for \$240. They plan to sell their lollipops for \$2 each. The sophomore class purchased 600 candy bars for \$750. They plan to sell their candy bars for \$3 each. Let x represent the number of items each class could sell, h(x) represent total potential profit for the freshman class and g(x) represent total potential profit for the sophomore class.
 - a. Write expressions for h(x) and g(x).

$$h(x) = 2x - 240$$
 $g(x) = 3x - 750$

b. For what value of x does h(x) = g(x)?

$$2x-240=3x-750$$

 $+240$ $+240$
 $2x=3x-510$ $-x=-510$
 $-3x-3x$ $x=510$

c. What does it mean for h(x) = g(x)?

At 510 pieces sold, the profits will be the same

d. What is a reasonable domain for h(x)?

[0,500]

e. What is a reasonable domain for g(x)?

[O, 600]

f. What do the domains tell us about this situation?

The Freshman class will not earn more than the suphonore class

Moviegoers at the local cinema can purchase a large tub
of popcorn for \$9. For a limited time, the cinema is offering
popcorn in a large commemorative Hunger Games tub
for \$25. Moviegoers purchase Hunger Games tub refills up
to 10 times for \$4 each over the next six months.

Let x represent the number of large tubs of popcorn consumed, f(x) represent amount spent on the \$9 tubs, and g(x) represent the amount spent on the Hunger Games tubs.

a. Write expressions for f(x) and g(x).

$$f(x) = 9x$$
 $g(x) = 25 + 4x$

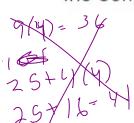
b. For what value of x does f(x) = g(x)?

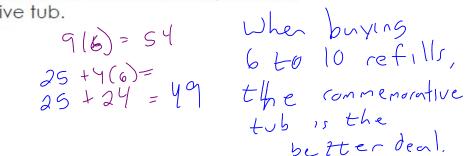
The cost & the popular is the same

c. What does it mean for f(x) = g(x)?

d. Write a reasonable domain for g(x).

e. Explain when it would be a better deal to purchase the commemorative tub.





BEAT THE TEST!

Axis Training Studio offers three options for small group training. With Option A, members pay a \$50 membership fee per month and \$15 per training session. With Option B, members pay \$150 per month for unlimited training sessions. With Option C, members pay \$1500 per year for unlimited monthly training sessions. The following system represents the monthly rate for the three options, where xrepresents the number of training sessions attended each month.

nth.

()
$$f(x) = 50 + 15x$$

(3) $g(x) = 125$) $f(x) = 150$

(4) $f(x) = 50 + 15x$

(5) $f(x) = 50 + 15x$

(6) $f(x) = 50 + 15x$

(7) $f(x) = 50 + 15x$

(8) $f(x) = 150$

Which of the following are true? Select all that apply. (5) = 125The monthly rate of Option A is represented by f(x). (5) = 125The monthly rate for Option C is represented by h(x). (5) = 125

- \triangle A reasonable domain for the functions is $x \ge 0$.
- ☐ If a member attends 6 training sessions during a given month, the monthly cost of Option B would be the best deal.
- If a member attends 5 training sessions during a given month, the monthly cost of Option A would be equal to the monthly cost of Option C.

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