Linear Systems: Solving Word Problems

Date Notes

1. Yasser is renting a car. Zeno Car Rental charges $45 for the rental of the car and $0.15 per kilometre driven. Erdos Car Rental charges $35 for the rental of the same car and $0.25 per kilometre driven. Which company should Yasser choose to rent the car from? **SET UP THE EQUATIONS, DO NOT SOLVE.** Let C rep. cost. Let n rep. # kms.

Zeno

Initial Value: $45

Rate: $0.15/km

Equation: $C = 0.15n + 45$

Erdos

Initial Value: $35

Rate: $0.25

Equation: $C = 0.25n + 35$.

2. After ticket sales at a basketball game, a cash box contains 87 coins in loonies and toonies. If the total value of the money is $161, how much of each kind of coin is there? The situation can be represented by the following linear system:

$l + t = 87$
$l + 2t = 161$

a) What does each variable represent?

l = # loonies

t = # toonies

b) Solve the system of equations by ELIMINATION.

$l + t = 87$ (x2) $\quad 2l + 2t = 174$

$l + 2t = 161 \quad -\ l + 2t = 161$

$l + 0 = 13$

$l = 13$

Sub. $l = 13$ into (1)

$(13) + t = 87$

$t = 87 - 13$

$t = 74$

POI is: (13, 74)

c) How many loonies are in the cash box? 13 loonies

d) How many toonies are in the cash box? 74 toonies

e) If the coach makes a mistake and there are 15 loonies, how many toonies? $15 + t = 87$ $\therefore$ 72 toonies. $t = 72$

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3. The student council is selling T-shirts. The cost of the T-shirts includes an $800 design and set-up charge, plus $4 per T-shirt. The T-shirts will sell for $20 each. The cost and revenue can be represented by the following equations:

Cost: $d = 800 + 4t$ ①

Revenue: $d = 20t$ ②

a) What does each variable represent?

t = # t-shirts sold

d = # dollars

b) Solve the linear system by SUBSTITUTION.

$d = 800 + 4t$ ①

$d = 20t$ ②

sub ① into ②

$800 + 4t = 20t$

$800 = 20t - 4t$

$\frac{800}{16} = \frac{16t}{16}$

$\boxed{50 = t}$

Sub. $t = 50$ into ②

$d = 20(50)$

$d = 1000$

POI: $(50, 1000)$

c) How many T-shirts does the student council need to sell to break even? 50 T-shirts

d) How much will it cost to have 200 T-shirts made?

Cost: $d = (800) + 4(200)$

$= \$1600$

∴ it will cost $1600.

e) What will the revenue be if all 200 T-shirts are sold?

Revenue: $d = 20(20)$

$= \$400$

∴ Revenue will be $400.

f) How much money will student council have raised if 200 T-shirts are sold?

Revenue - Cost

$1600 - 400 = \$1200$

∴ $1200 in revenue will be made.