SOLVING SYSTEMS OF EQUATIONS

WORD PROBLEMS

Steps:

1. Identify the variables (unknowns)
2. Translate the situation using a system of equations (two equations)
3. Solve for x and y
4. Answer the question

Ex:

In an office of 50 employees, there are five more men than twice the number of women. How many men and how many women are there in this office?

x = # of men

y = # of women

$x = 2y + 5$

$x + y = 50$ → $x = 50 - y$

$2y + 5 = 50 - y$

$2y + y = 50 - 5$

$3y = 45$

$y = 15$

$x = 50 - 15 = 35$

Oct 19-8:52 AM

The Xandev car rental company charges a basic fee of $15 per day plus 10 cents per kilometer. The Rak car rental company charges a basic fee of $25 per day plus 5 cents per kilometer. What distance must be travelled for the two companies to charge the same amount?

x = distance

y = total cost

$y = 0.1x + 15$

$y = 0.05x + 25$

$0.1x + 15 = 0.05x + 25$

$0.1x - 0.05x = 25 - 15$

$0.05x = 10$

$x = 200$ km

$y = 0.1x + 15$

$y = (0.1)(200) + 15$

$y = 35$

$y = 0.05x + 25$

$y = (0.05)(200) + 25$

$y = 35$

Oct 19-8:59 AM

A group of 5 adults and 8 children must pay a total of $170 to enter an amusement park. Another group of 4 adults and 6 children must pay a total of $132 to enter the same park. How much will it cost for a group of 7 adults and 12 children to enter this park?

x = cost adult

y = cost children

$5(5x + 8y = 170)$

$8(4x + 6y = 132)$

$20x + 32y = 680$

$-(20x + 30y = 660)$

$-20x - 30y = -660$

$2y = 20$

$y = 10$

$5x + 8y = 170$ (y = 10)

$5x + (8)(10) = 170$

$5x + 80 = 170 - 80$

$5x = 90$

$x = 18$

$7(18) + 12(10)$

$126 + 120$

246

Oct 19-9:02 AM

A school principal has the choice of two transportation companies to organize a field trip for the students. The first company charges a base amount of $120 plus $1.50 per student. The second company charges a base amount of $80 plus $2 per student. How many students must come for the transportation costs to be the same for both companies?

x = # of students

y = total cost

$y = 1.5x + 120$

$y = 2x + 80$

$1.5x + 120 = 2x + 80$ (−2x, −120)

$1.5x - 2x = 80 - 120$

$-0.5x = -40$

$-0.5 \quad -0.5$

$x = 80$

Oct 19-9:15 AM

Caroline receives a weekly base salary of $120 plus a $10 commission for every item sold. Jessica receives a weekly base salary of $150 and an $8 commission for every item sold. How many items must they each sell to earn the same weekly salary?

x = # of items

y = weekly salary

$y = 10x + 120$

$y = 8x + 150$

$10x + 120 = 8x + 150$ (−8x, −120)

$2x = 30$

$\therefore x = 15$

Oct 19-9:17 AM

In the month of June, a bicycle shop spends $2100 to buy 6 racing bikes and 4 mountain bikes. In July, the shop spends $8700 to buy 12 racing bikes and 18 mountain bikes. How much will the shop spend in August to buy 8 racing bikes and 10 mountain bikes?

x = # R bikes → 350

y = # M bikes → 250

(2) $6x + 4y = 3100$

$12x + 18y = 8700$

$12x + 8y = 6200$

$-(12x + 18y = 8700)$

$0x - 10y = -2500$

$-10y = -2500$

$-10 \quad -10$

$y = 250$

$12x + 18(250) = 8700$

$12x + 4500 = 8700$ (−4500)

$12x = 4200$

$12 \quad 12$

$x = 350$

$8(350) + 10(250) = ?$

$2800 + 2500 = 5300$

Oct 19-9:04 AM

Natalie earns an hourly wage of $7.50 from her employer whereas Eric earns an hourly wage of $6.50 at his job.

Over the course of a weekend, Natalie worked 4 hours less than Eric. Together, they earned a total of $194. How much would they have earned if Natalie had worked the same number of hours as Eric.

$7.50x + 6.50y = 194$

x = # hrs Nat
y = # hrs Eric

$x = y - 4$

$15 - 4 = 11$

$\frac{7.50x}{7.50} = \frac{194}{7.5} - \frac{6.5y}{7.5}$

$x = 25.9 - 0.9y$

$x = y - 4$

$25.9 - 0.9y = y - 4$

$+0.9y \quad +4$

$\frac{30}{2} \quad \frac{29.9}{1.9} = \frac{1.9y}{1.9}$

$15 = y$

$7.50(15) + 6.50(15) =$

210

Oct 19-9:12 AM

The length of a rectangular plot of land measures 10 meters more than twice its width. The plot has a perimeter of 110 meters. How much does this plot cost if it is sold for $50 per square meter?

Oct 19-9:20 AM

Caroline is working this summer at a grocery store and at the pharmacy. The first week, she earned $138 working 12 hours at the grocery store and 8 hours at the pharmacy. The second week, she earned $142 working 8 hours at the grocery store and 12 hours at the pharmacy. How much will she earn the third week if she works 10 hours at the grocery store and 14 at the pharmacy?

Oct 19-9:07 AM