

6.4 Applications of Linear Systems WORKSHEET

Name: Solutions KEY
Date: _____

* you can do SUBSTITUTION or ADDITION for all of these... your choice!

1. Two shirts and one sweater cost \$60. Three shirts and two sweaters cost \$104. Write a system of equations to represent this problem. Start by giving a let statement for x and for y. Then, solve the system to find the cost of one shirt and the cost of one sweater. let x = cost of shirt, let y = cost of sweater

① $2x + y = 60$ → $y = 60 - 2x$
 ② $3x + 2y = 104$
 $3x + 2(60 - 2x) = 104$
 $3x + 120 - 4x = 104$
 $-x + 120 = 104$
 $-x = -16$
 $x = 16$
 ③ $y = 60 - 2x$
 $y = 60 - 2(16)$
 $y = 60 - 32$
 $y = 28$
 cost of 1 shirt \$16,
 cost of 1 sweater \$28

rectangle
 $P = 2l + 2w$

2. The length of a basketball court is 7 meters longer than its width. The perimeter of basketball court is 82m. Draw a diagram for assistance, give let statements, build two equations, and find the length of the court and the width of the court. let l = length, let w = width

① $l = w + 7$
 ② $2l + 2w = 82$
 $2(w + 7) + 2w = 82$
 $2w + 14 + 2w = 82$
 $4w = 68$
 $w = 17$
 ① $l = w + 7$
 $l = 17 + 7$
 $l = 24$
 width is 17m,
 length is 24m

3. For the puppet play at the library, tickets for adults and tickets for children were sold. Give let statements. The total number of tickets sold was 256. Write your first equation. Tickets for adults cost \$5 each and tickets for children cost \$2 each. The total revenue was \$767. Write your second equation. How many adult tickets were sold and how many children tickets were sold? Solve the system. let a = # of adult tix sold, let c = # of child tix sold

① $a + c = 256$
 ② $5a + 2c = 767$
 + ① $-2a - 2c = -512$

 $3a = 255$
 $a = 85$
 ① $a + c = 256$
 $(85) + c = 256$
 -85 -85
 $c = 171$
 85 adult tix sold,
 and 171 child tix sold

4. At a fitness centre, the initiation fee is twice the cost of the monthly fee. If the cost of the initiation fee plus 7 months of fitness is \$252, what is the initiation fee and monthly fee? let i = initiation fee, let m = monthly fee

① $i = 2m$

② $i + 7m = 252$
 $(2m) + 7m = 252$
 $9m = 252$
 $\frac{9m}{9} = \frac{252}{9}$

$m = 28$

① $i = 2m$
 $i = 2(28)$

$i = 56$

initiation fee is \$56,
and monthly fee is \$28

5. A person invested \$2000. A portion of the \$2000 was invested at 4% per year. The other portion was invested at 5% per year (when you put % in an equation, change to decimal... 4% would be 0.04). After one year, the total interest earned was \$95. How much was invested at 4% and how much was invested at 5%.

Hint: Let x = portion of \$2000 invested at 4% and let y = portion of \$2000 invested at 5%... build two equations... solve by substitution.

① $x + y = 2000 \rightarrow$ ③ $y = 2000 - x$

② $0.04x + 0.05y = 95$
 $0.04x + 0.05(2000 - x) = 95$
 $0.04x + 100 - 0.05x = 95$
 $\frac{-0.01x}{-0.01} = \frac{-5}{-0.01}$

$x = 500$

③ $y = 2000 - x$
 $y = 2000 - 500$

$y = 1500$

\$500 invested @ 4%,
\$1500 invested @ 5%

6. Jennifer had a total of \$500 invested in high-yield investments. Part of the \$500 was invested at 7% per year and the rest at 10% per year. After one year, the total interest earned was \$44. How much did Jennifer invest at each rate? let x = portion of \$500 invested @ 7% (0.07) let y = portion of \$500 invested @ 10% (0.10)

① $x + y = 500 \rightarrow$ ③ $y = 500 - x$

② $0.07x + 0.1y = 44$
 $0.07x + 0.1(500 - x) = 44$
 $0.07x + 50 - 0.1x = 44$
 $\frac{-0.03x}{-0.03} = \frac{-6}{-0.03}$

$x = 200$

③ $y = 500 - x$
 $y = 500 - 200$
 $y = 300$

now, look at "let" statements

\$200 invested @ 7%,
\$300 invested @ 10%

so... Calgary is bigger than Regina!

7. ① The area of Regina is two thirds of the area of Calgary. ② The difference in the areas of the two cities is 1 700 km². What is the area of each city?

let R = area of Regina

let C = area of Calgary

① $R = \frac{2}{3}C$

Bigger city
→ Smaller city
= +1700

② $C - R = 1700$

$C^{x3} - \frac{2}{3}C^{x3} = 1700^{x3}$

$3C - 2C = 5100$

$C = 5100$

① $R = \frac{2}{3}C$

$R = \frac{2}{3}(5100)$

$R = 3400$

Area of Regina is 3400 km²,
Area of Calgary is 5100 km²

8. ① Balcony seats for the gymnastics championships costs \$10, and floor-level seats cost \$15. ② The total number of tickets sold was 331. The total revenue from sales was \$3 915. How many balcony seats were sold? Floor-level?

let B = # of Balcony seats sold, Let F = # of floor seats

total tix ① $(B + F = 331) \times -10$

revenue ② $10B + 15F = 3915$

① $-10B - 10F = -3310$

$8F = \frac{605}{5}$

$F = 121$

① $B + F = 331$

$B + (121) = 331$
 $-121 \quad -121$

$B = 210$

210 Balcony Seats and 121 Floor Seats were sold.

- ANSWER KEY ON BACK -