NAME Key

Objective: Use Systems of Equations to Solve Real-World Problems

POPULATION

1) In 1990, the population of the Midwest was about 60 million. During the 1990s, the population of this area increased an average of about 0.4 million per year. $M = 60 + 0.4x$

The population of the West was about 53 million in 1990. The population of this area increased an average of about 1 million per year during the 1990s. $W = 53 + 1x$

Assume that the rate of growth of these areas remains the same. Estimate when the population of the West would be equal to the population of the Midwest.

$60 + 0.4x = 53 + 1x$

$7 = .6x$

$11.6 = x$

11.6 years later → 2001

SPORTS

2) At the end of the 2000 baseball season, the New York Yankees and the Cincinnati Reds had won a total of 31 World Series. The Yankees had won 5.2 times as many World Series as the Reds. How many World Series did each team win?

$Y + R = 31$ $\quad y = 5.2R$

$5.2R + R = 31$

$6.2R = 31$

$R = 5$

$y = 31 - 5 = 26$

Reds won 5
Yankees won 26

PARKS

3) A youth group and their leaders visited Mammoth Cave. Two adults and 5 students in one van paid \$77 for the Grand Avenue Tour of the cave. Two adults and 7 students in a second van paid \$95 for the same tour. Find the adult price and the student price of the tour.

$2a + 5S = 77$

$2a + 7S = 95$

$2a + 5S = 77$

$-2a - 7S = -95$

$-2S = -18$

$S = 9$

$2a + 5(9) = 77$

$2a + 45 = 77$

$2a = 32$

$a = 16$

FOOTBALL

4) During the National Football League's 1999 season, Troy Aikman, the quarterback for the Dallas Cowboys, earned \$0.467 million more than Deion Sanders, the Cowboys cornerback. Together they cost the Cowboys \$12.867 million. How much did each player make?

$A + S = 12.867$

$A = 0.467 + S$

$0.467 + S + S = 12.867$

$2S = 12.4$

$S = 6.2$ million

$A = 0.467 + 6.2 = 6.667$ mil

BUSINESS

5) The owners of the River View Restaurant have hired enough servers to handle 17 tables of customers, and the fire marshal has approved the restaurant for a limit of 56 customers. How many two-seat tables and how many four-seat tables should the owners purchase?

$17 = T + F$

$2T + 4F = 56$

$17 = T + 15$

$T = 2$

$T = F - 17$

$2(F-17) + 4F = 56$

$2F - 34 + 4F = 56$

$6F = 90$

$F = 15$

CELL PHONES

6) The price of a cellular telephone plan is based on peak and nonpeak service. Kelsey used 45 peak minutes and 50 nonpeak minutes and was charged $27.75. That same month, Mitch used 70 peak minutes and 30 nonpeak minutes for a total charge of $36. What are the rates per minute for peak and nonpeak time?

$3(45p + 50n = 27.75)$

$135p + 150n = 83.25$

$-5(70p + 30N = 36)$

$-350p - 150n = -180$

$-215p = -96.75$

$p = 0.45$

$70(0.45) + 30n = 36$

$31.50 + 30n = 36$

$30n = 4.5$

$n = 0.15$

MOVIE THEATER

7) The manager of a movie theater found that Saturday's sales were $3675. He knew that a total of 650 tickets were sold Saturday. Adult tickets cost $7.50, and children's tickets cost $4.50. How many of each kind of ticket were sold?

$A + C = 650$

$7.50A + 4.50C = 3675$

$A = 650 - C$

$7.50(650 - C) + 4.50C = 3675$

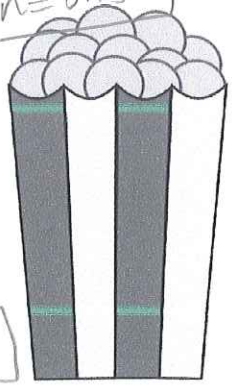
$4875 - 7.5C + 4.5C = 3675$

$-3C = -1200$

$C = 400$

$A + 400 = 650$

$A = 250$



BIRD CLUB

8) A birding club holds an annual photography contest among its members. After a set time limit in a particular park, contestants receive 4 points for photos of songbirds and 20 points for photos of birds of prey. Last year's winner had a total of 200 points from 38 photos of individual birds. How many of each type of bird did the winner photograph?

$4S + 20p = 200$

$S + p = 38$

$S = 38 - p$

$S = 38 - 3 = 35$

$4(38 - p) + 20p = 200$

$152 - 4p + 20p = 200$

$152 + 16p = 200$

$+16p = 48$

$p = 3$