#26

Name Key
8A; Algebra 1

Date 16-17
Period

How Do We Use Two Variables To Solve Word Problems? Day II

1) A soda machine contains 20 coins; some of the coins are nickels and the rest are quarters. If the value of the coins is $4.40, find the number of coins of each kind.

L

Let
x = the # of nickels
y = the # of quarters

E

$ + $ = $; # + # = #

$.1(.05x + .25y = 4.40) \rightarrow .05x + .25y = 4.40$
$-.05(x + y = 20) \rightarrow +(-.05x - .05y = -1.00)$

$.20y = 3.40$
$\frac{.20y}{.20} = \frac{3.40}{.20}$
$y = 17$

$x + y = 20$
$x + 17 = 20$
$-17 \quad -17$
$x = 3$

S

There were 3 nickels + 17 quarters

C

$3 + 17 = 20$

$3(.05) = .15$
$17(.25) = 4.25$
$4.40 \checkmark$

2) For a rehearsal performance, 4 adult tickets and 5 senior citizen tickets cost $27.75. For the same performance, 12 adult tickets and 8 senior citizen tickets cost $64. Find the price of each kind of ticket.

L

Let
x = the cost of 1 adult ticket
y = the cost of 1 senior citizen tickets

E

$12(4x + 5y = 27.75) \rightarrow 48x + 60y = 333$
$-4(12x + 8y = 64) \rightarrow +(-48x - 32y = -256)$

$\frac{28y}{28} = \frac{77}{28}$
$y = 2.75$

$4x + 5y = 27.75$
$4x + 5(2.75) = 27.75$
$4x + 13.75 = 27.75$
$-13.75 \quad -13.75$
$\frac{4x}{4} = \frac{14}{4}$
$x = 3.5$

S

The price of one adult ticket is $3.50 & the price of a senior citizen ticket is $2.75

C

$4(3.5) = 14$
$5(2.75) = +13.75$
27.75

$12(3.5) = 42$
$8(2.75) = +22$
$64 \checkmark$

3) A woman bought 7 ears of corn and 6 oranges for $3.66. At the same unit prices, a second woman bought 10 ears of corn and 3 oranges for $3.39. Find the price of an ear of corn and the price of an orange.

L

Let
x = the price of 1 ear of corn
y = the price of 1 orange

E

$10(7x + 6y = 3.66) \rightarrow 70x + 60y = 36.6$
$-7(10x + 3y = 3.39) \rightarrow -70x - 21y = -23.73$

$\frac{39y}{39} = \frac{12.87}{39}$
$y = .33$

$7x + 6y = 3.66$
$7x + 6(.33) = 3.66$
$7x + 1.98 = 3.66$
$-1.98 \quad -1.98$
$\frac{7x}{7} = \frac{1.68}{7}$
$x = .24$

S

The price of 1 ear of corn is $.24 & the price of 1 orange is $.33

C

$7(.24) = 1.68$
$6(.33) = +1.98$
$3.66 \checkmark$

$10(.24) = 2.40$
$3(.33) = +.99$
$3.39 \checkmark$

$\$ + \$ = \$$ $\#_1 + \#_2 = \#$

4) The total attendance at a school play was 425. The tickets for the students were $2.50 each, and the regular tickets were $3.75 each. If the total receipts were $1,125, how many tickets of each kind were sold?

L

let
x = the # of student tickets sold
y = the # of regular tickets sold

E

$1(2.50x + 3.75y = 1125) \rightarrow 2.50x + 3.75y = 1125$
$-2.50(x + y = 425) \rightarrow -2.50x - 2.50y = -1062.50$

$1.25y = 62.5$
$\frac{1.25}{1.25} \quad \frac{1.25}{1.25}$
$y = 50$

$x + y = 425$
$x + 50 = 425$
$-50 \quad -50$
$x = 375$

S

There were 375 student tickets sold + 50 regular tickets sold

C

$375(2.5) = 937.5$
$50(3.75) = 187.5$
1125

$375 + 50 = 425$

5) Jim has four more quarters than dimes. If he has $5.20 in quarters and dimes, how many of each type of coin does he have?

$\# + \$ = \$$

L

let
x = the # of quarters
y = the # of dimes

E

$.25x + .10y = 5.20$
$y + 4 = x$

$.25x + .10y = 5.20$
$.25(y+4) + .10y = 5.20$
$.25y + 1.00 + .10y = 5.20$
$.35y + 1.00 = 5.20$
$-1.00 \quad -1.00$
$\frac{.35y}{.35} = \frac{4.20}{.35}$
$y = 12$

$y + 4 = x$
$12 + 4 = x$
$16 = x$

★ Since the Q's already have 4 more you need to add the 4 to the dimes to make them =

S

Jim has 16 quarters + 12 dimes

C

$.25(16) \quad 4.00$
$.10(12) = 1.20$
$5.20 \checkmark$

$12 + 4 = 16 \checkmark$

6) Tickets for a high school dance cost $4.50 each if purchased in advance, and $5.50 each if bought at the door. For the dance, 250 tickets were sold, and $1,200 was collected. How many tickets were sold at the door?

$\$ + \$ = \$$ $\#_1 + \#_2 = \#$

L

let
x = the # of tickets sold in advance
y = the # of tickets sold at the door

E

$1(4.50x + 5.50y = 1200) \rightarrow 4.50x + 5.50y = 1200$
$-4.5(x + y = 250) \rightarrow -4.50x - 4.50y = -1125$

$1y = 75$
$\frac{1}{1} \quad \frac{1}{1}$
$y = 75$

$x + y = 250$
$x + 75 = 250$
$-75 \quad -75$
$x = 175$

S

There were 75 tickets sold at the door + 175 tickets sold in advance

C

$175(4.5) = 787.50$
$75(5.5) = 412.50$
$1200 \checkmark$

$75 + 175 = 250 \checkmark$

7) If 5 times the smaller of two numbers is subtracted from twice the larger, the result is 16. If the larger is increased by 3 times the smaller, the result is 63. Find the numbers.

L

let
x = the smaller #

y = the larger #

E

$1(2y - 5x = 16) \rightarrow 2y - 5x = 16$

$-2(y + 3x = 63) \rightarrow -2y - 6x = -126$

$-11x = -110$

$\frac{-11x}{-11} = \frac{-110}{-11}$

$x = 10$

$2y - 5x = 16$

$2y - 5(10) = 16$

$2y - 50 = 16$

$+50 \quad +50$

$\frac{2y}{2} = \frac{66}{2}$

$y = 33$

S

the smaller # is 10

+

the larger # is 33

C

$5(10) = 50$

$2(33) = 66$

$66 - 50 = 16$ ✓

$3(10) = 30$

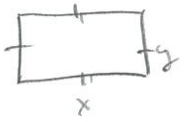
$33 + 30 = 63$ ✓

8) A rectangle has a perimeter of 38 feet. The length is 1 foot less than 3 times the width. Find the dimensions of the rectangle. $2L + 2W = P$

L

let
x = the length of the rectangle

y = the width of the rectangle



E

$2x + 2y = 38$

$x = 3y - 1$

$2x + 2y = 38$

$2(3y - 1) + 2y = 38$

$6y - 2 + 2y = 38$

$8y - 2 = 38$

$+2 \quad +2$

$\frac{8y}{8} = \frac{40}{8}$

$y = 5$

$x = 3y - 1$

$x = 3(5) - 1$

$x = 15 - 1$

$x = 14$

S

the width of the rectangle is 5ft +

the length of the rectangle is 14ft

C

$2(5) = 10$

$2(14) = 28$

38 ✓

$3(5) = 15$

$15 - 1 = 14$ ✓

9) The sum of two numbers is 36. Their difference is 24. Find the numbers.

L

Let
x = the 1st #

y = the 2nd #

E

$1(x + y = 36) \rightarrow x + y = 36$

$-1(x - y = 24) \rightarrow -x + y = -24$

$\frac{2y}{2} = \frac{12}{2}$

$y = 6$

$x + y = 36$

$x + 6 = 36$

$-6 \quad -6$

$x = 30$

S

The 1st # is 30

+

The 2nd # is 6

C

$30 + 6 = 36$ ✓

$30 - 6 = 24$ ✓

10) Jamie is 5 years older than her sister Amy. If the sum of their ages is 19, how old is Jamie?

L

let
x = Jamie's age

y = Amy's age

E

$x = 5 + y$

$x + y = 19$

$x + y = 19$

$(5 + y) + y = 19$

$5 + y + y = 19$

$5 + 2y = 19$

$-5 \quad -5$

$\frac{2y}{2} = \frac{14}{2}$

$y = 7$

$x = 5 + y$

$x = 5 + 7$

$x = 12$

Since Jamie is 5y is older than Amy, add the 5 to Amy to make them =

S

Jamie is 12yrs old

+

Amy is 7yrs old

C

$7 + 5 = 12$ ✓

$12 + 7 = 19$ ✓

11) Tickets for a high school dance cost $10 each if purchased in advance of the dance, but $15 each if bought at the door. If 100 tickets were sold and $1,200 was collected, how many tickets were sold in advance and how many were sold at the door?

L

let
x = The # of tickets sold in advance

y = The # of tickets sold at the door

E

$\$ + \$ = \$$ $\quad\quad$ $\#T + \#H = H$

$1(10x + 15y = 1200) \rightarrow 10x + 15y = 1200$

$-10(x + y = 100) \rightarrow -10x - 10y = -1000$ (+)

$\frac{5y}{5} = \frac{200}{5}$

$y = 40$

$x + y = 100$

$x + 40 = 100$

$-40 \quad -40$

$x = 60$

S

There were 60 tickets sold in advance & 40 tickets sold at the door

C

$10(6) = 600$

$40(15) = 600$

1200 ✓

$60 + 40 = 100$ ✓