Name: __Key__
Period: _____

1. A cruise ship made a trip to Guam and back. The trip there took 12 hours and the trip back took nine hours. It averaged 20 km/h on the return trip. Find the average speed of the trip there.

	rate	Time	Dist.
there	X	12	y
back	20	9	y

$12x = y$
$20(9) = y$
$180 = y$

$12x = 180$
$x = 15$
average speed
15 km/h

Mixture Problems

3. Kristin wants to make 6 gal. of a 34% alcohol solution by mixing together a 24% alcohol solution and a 64% alcohol solution. How much of each solution must she use?

$x + y = 6 \rightarrow y = -x + 6$
$24x + 64y = 204$
$4.5 + y = 6$
$y = 1.5$

$24x + 64(-x+6) = 204$
$24x - 64x + 384 = 204$
$-40x = -108$
$x = 4.5$

4. How many gal. of a 65% saline solution must be mixed with 8 gal. of pure water to make a 25% solution? *Hint: pure water has 0 saline.*

$x + 8 = y$
$65x + 0 = 25y$
$65x = 25(x+8)$
$65x = 25x + 200$

$40x = 200$
$x = 5$

$5 + 8 = y$
$13 = y$

5. 1 oz of walnuts were mixed with 4 oz of peanuts which cost $4/oz to make mixed nuts which cost $5/oz. What is the price per oz of walnuts?

$x + 16 = 25$
$x = \$9/oz$

2. A plane traveled 580 miles to Ankara and back. The trip there was with the wind. It took 5 hours. The trip back was into the wind. The trip back took 10 hours. Find the speed of the plane in still air and the speed of the wind.

	rate	time	dist.
Down	r+w	5	580
Up	r-w	10	580

$\frac{5(r+w)}{5} = \frac{580}{5}$
$r + w = 116$
$87 + w = 116$
$w = \boxed{w = 29 mph}$

$10(r-w) = 580$
$r - w = 58$
$r + w = 116$ speed of plane
$2r = 174$
$\boxed{r = 87 mph}$

	Amount	%	Total
Solution 1	X	24	24x
Solution 2	y	64	64y
Mixture	6	34	204

Solution 1 - 24% → 4.5g
Solution 2 - 64% → 1.5g

	Amount	%	Total
Solution 1	X	65	65x
Solution 2	8	0	0
Mixture	y	25	25y

Solution 65% → 5g
Mixture → 13g

	Amount	Cost	Total
Walnuts	1	X	X
Peanuts	4	$4	16
Mixture	5	$5	25

Define the variables (be specific), write a system of equations, and solve. Write your final answer in a complete sentence.

6. The sum of two numbers is the same as four times the smaller number. If twice the larger is decreased by the smaller, the result is 30. Find the numbers.

7. A group of students go out for lunch. If two have hamburgers and five have hot dogs, the bill will be $8. If five have hamburgers and two have hot dogs, it will cost $9.50. What is the price of the hamburger?

Let x = Small number
y = larger number

$$x + y = 4x \qquad y = 3x$$
$$2y - x = 30 \qquad y = 3(6)$$
$$\qquad\qquad\qquad y = 18$$

$$2(3x) - x = 30$$
$$6x - x = 30$$
$$5x = 30$$
$$x = 6$$

Let x = hamburgers
y = hot dogs

$$-5(2x + 5y = 8)$$
$$2(5x + 2y = 9.50)$$

$$-10x - 25y = -40$$
$$\underline{10x + 4y = 19}$$
$$-21y = -21$$
$$y = 1$$

$$2x + 5(1) = 8$$
$$2x + 5 = 8$$
$$2x = 3$$
$$x = 3/2 = 1.50$$

Hamburgers cost $1.50
Hot dogs cost $1.00