Name _____ Date _____

Multi-Step Problems—All Operations

Solve the problem using tables and equations, and then check your answer with the word problem. Try to find the answer only using two rows of numbers on your table.

A pet store owner, Byron, needs to determine how much food he needs to feed the animals. Byron knows that he needs to order the same amount of bird food as hamster food. He needs four times as much dog food as bird food and needs half the amount of cat food as dog food. If Byron orders 600 packages of animal food, how much dog food does he buy? Let b represent the number of packages of bird food Byron purchased for the pet store.

Solve the problems, and then check your answers with the word problem.

1. On average, a baby uses three times the number of large diapers as small diapers and double the number of medium diapers as small diapers.
   a. If the average baby uses $2{,}940$ diapers, size large and small, how many of each size would be used?
   b. Support your answer with equations.

2. Tom has three times as many pencils as pens but has a total of 100 writing utensils.
   a. How many pencils does Tom have?
   b. How many more pencils than pens does Tom have?

3. Serena's mom is planning her birthday party. She bought balloons, plates, and cups. Serena's mom bought twice as many plates as cups. The number of balloons Serena's mom bought was half the number of cups.
   a. If Serena's mom bought 84 items, how many of each item did she buy?
   b. Tammy brought 12 balloons to the party. How many total balloons were at Serena's birthday party?
   c. If half the plates and all but four cups were used during the party, how many plates and cups were used?

4. Elizabeth has a lot of jewelry. She has four times as many earrings as watches but half the number of necklaces as earrings. Elizabeth has the same number of necklaces as bracelets.
   a. If Elizabeth has 117 pieces of jewelry, how many earrings does she have?
   b. Support your answer with an equation.

5. Claudia was cooking breakfast for her entire family. She made double the amount of chocolate chip pancakes as she did regular pancakes. She only made half as many blueberry pancakes as she did regular pancakes. Claudia also knows her family loves sausage, so she made triple the amount of sausage as blueberry pancakes.
   a. How many of each breakfast item did Claudia make if she cooked 90 items in total?
   b. After everyone ate breakfast, there were 4 chocolate chip pancakes, 5 regular pancakes, 1 blueberry pancake, and no sausage left. How many of each item did the family eat?

6. During a basketball game, Jeremy scored triple the number of points as Donovan. Kolby scored double the number of points as Donovan.
   a. If the three boys scored 36 points, how many points did each boy score?
   b. Support your answer with an equation.

Solve the problem using tables and equations, and then check your answer with the word problem. Try to find the answer only using two rows of numbers on your table.

A pet store owner, Byron, needs to determine how much food he needs to feed the animals. Byron knows that he needs to order the same amount of bird food as hamster food. He needs four times as much dog food as bird food and needs half the amount of cat food as dog food. If Byron orders 600 packages of animal food, how much dog food does he buy? Let b represent the number of packages of bird food Byron purchased for the pet store.

Bird Food	*Hamster Food*	*Dog Food*	*Cat Food*	*Total*
1	1	4	2	8

The rest of the table will vary (unless they follow suggestions from the Closing).

Bird Food	*Hamster Food*	*Dog Food*	*Cat Food*	*Total*
1	1	4	2	8
75	75	300	150	600

Byron would need to order 300 packages of dog food.

The answer makes sense because Byron ordered the same amount of bird food and hamster food. The table also shows that Byron order four times as much dog food as bird food, and the amount of cat food he ordered is half the amount of dog food. The total amount of pet food Byron ordered was 600 packages, which matches the word problem.

Algebraically: Let b represent the number of packages of bird food Byron purchased for the pet store. Therefore, b also represents the amount of hamster food, $4b$ represents the amount of dog food, and $2b$ represents the amount of cat food required by the pet store.

$$\begin{aligned} b + b + 4b + 2b &= 600 \\ 8b &= 600 \\ 8b \div 8 &= 600 \div 8 \\ b &= 75 \end{aligned}$$

Therefore, Byron will order 75 pounds of bird food, which results in 300 pounds of dog food because $4(75) = 300$.

Solve the problems, and then check your answers with the word problem.

1. On average, a baby uses three times the number of large diapers as small diapers and double the number of medium diapers as small diapers.

   a. If the average baby uses $2,940$ diapers size large and small, how many of each size would be used?

Small	*Medium*	*Large*	*Total*
1	2	3	6
490	980	$1,470$	$2,940$

An average baby would use 490 small diapers, 980 medium diapers, and $1,470$ large diapers.

The answer makes sense because the number of large diapers is 3 times more than small diapers. The number of medium diapers is double the number of small diapers, and the total number of diapers is $2,940$.

b. Support your answer with equations.

Let s represent the number of small diapers a baby needs. Therefore, $2s$ represents the number of medium diapers, and $3s$ represents the amount of large diapers a baby needs.

$$s + 2s + 3s = 2,940$$
$$6s = 2,940$$
$$\frac{6s}{6} = \frac{2940}{6}$$
$$s = 490$$

Therefore, a baby requires 490 small diapers, 980 medium diapers (because $2(490) = 980$), and $1,470$ large diapers (because $3(490) = 1,470$), which matches the answer in part (a).

2. Tom has three times as many pencils as pens but has a total of 100 writing utensils.

a. How many pencils does Tom have?

Pencils	*Pens*	*Total*
3	1	4
75	25	100

b. How many more pencils than pens does Tom have?

$75 - 25 = 50$. *Tom has 50 more pencils than pens.*

3. Serena's mom is planning her birthday party. She bought balloons, plates, and cups. Serena's mom bought twice as many plates as cups. The number of balloons Serena's mom bought was half the number of cups.

a. If Serena's mom bought 84 items, how many of each item did she buy?

Balloons	*Plates*	*Cups*	*Total*
1	4	2	7
12	48	24	84

Serena's mom bought 12 balloons, 48 plates, and 24 cups.

b. Tammy brought 12 balloons to the party. How many total balloons were at Serena's birthday party?

$12 + 12 = 24$. *There were 24 total balloons at the party.*

c. If half the plates and all but four cups were used during the party, how many plates and cups were used?

$\frac{1}{2} \cdot 48 = 24$. *Twenty-four plates were used during the party.*

$24 - 4 = 20$. *Twenty cups were used during the party.*

4. Elizabeth has a lot of jewelry. She has four times as many earrings as watches but half the number of necklaces as earrings. Elizabeth has the same number of necklaces as bracelets.

a. If Elizabeth has 117 pieces of jewelry, how many earrings does she have?

Earrings	*Watches*	*Necklaces*	*Bracelets*	*Total*
4	1	2	2	9
52	13	26	26	117

Elizabeth has 52 earrings, 13 watches, 26 necklaces, and 26 bracelets.

b. Support your answer with an equation.

Let w represent the number of watches Elizabeth has. Therefore, $4w$ represents the number of earrings Elizabeth has, and $2w$ represents both the number of necklaces and bracelets she has.

$$4w + w + 2w + 2w = 117$$
$$9w = 117$$
$$\frac{9w}{9} = \frac{117}{9}$$
$$w = 13$$

Therefore, Elizabeth has 13 watches, 52 earrings because $4(13) = 52$, and 26 necklaces and bracelets each because $2(13) = 26$.

5. Claudia was cooking breakfast for her entire family. She made double the amount of chocolate chip pancakes as she did regular pancakes. She only made half as many blueberry pancakes as she did regular pancakes. Claudia also knows her family loves sausage, so she made triple the amount of sausage as blueberry pancakes.

a. How many of each breakfast item did Claudia make if she cooked 90 items in total?

Chocolate Chip Pancakes	*Regular Pancakes*	*Blueberry Pancakes*	*Sausage*	*Total*
4	2	1	3	10
36	18	9	27	90

Claudia cooked 36 chocolate chip pancakes, 18 regular pancakes, 9 blueberry pancakes, and 27 pieces of sausage.

b. After everyone ate breakfast, there were 4 chocolate chip pancakes, 5 regular pancakes, 1 blueberry pancake, and no sausage left. How many of each item did the family eat?

The family ate 32 chocolate chip pancakes, 13 regular pancakes, 8 blueberry pancakes, and 27 pieces of sausage during breakfast.

6. During a basketball game, Jeremy scored triple the number of points as Donovan. Kolby scored double the number of points as Donovan.

a. If the three boys scored 36 points, how many points did each boy score?

Jeremy	*Donovan*	*Kolby*	*Total*
3	1	2	6
18	6	12	36

Jeremy scored 18 points, Donovan scored 6 points, and Kolby scored 12 points.

b. Support your answer with an equation.

Let d represent the number of points Donovan scored, which means $3d$ represents the number of points Jeremy scored, and $2d$ represents the number of points Kolby scored.

$$3d + d + 2d = 36$$
$$6d = 36$$
$$\frac{6d}{6} = \frac{36}{6}$$
$$d = 6$$

Therefore, Donovan scored 6 points, Jeremy scored 18 points because $3(6) = 18$, and Kolby scored 12 points because $2(6) = 12$.