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3–6 Problem Solving: Using Charts

Objective: To organize the facts of a problem in a chart.

Example 1 Organize the given information in a chart: In game 1 Jesse scored twice as many points as Ramon. In game 2 Jesse scored six fewer points than he did in game 1. In game 2 Ramon scored eight more points than he did in game 1.

Solution

	Game 1 points	Game 2 points
Jesse	$2n$	$2n - 6$
Ramon	n	$n + 8$

Example 2 Solve the problem using the two given facts:
Find the number of Calories in a banana and in a peach.
(1) A banana contains 65 Calories more than a peach.
(2) Ten peaches have 50 fewer Calories than 4 bananas.

Solution

Step 1 The problem asks for the number of Calories in a banana and in a peach.

Step 2 Let p = the number of Calories in a peach.
Then $p + 65$ = the number of Calories in a banana.

	Calories per fruit ×	Number of fruit =	Total Calories
Peach	p	10	$10p$
Banana	$p + 65$	4	$4(65 + p)$

Step 3 Calories in 10 peaches = Calories in 4 bananas − 50
$10p = 4(p + 65) - 50$

Step 4 Solve.
$10p = 4p + 260 - 50$
$6p = 210$
$p = 35$ and $p + 65 = 100$

Step 5 *Check:* (1) 100 Calories is 65 more than 35 Calories. (2) Ten peaches have $10 \cdot 35$, or 350, Calories and four bananas have $4 \cdot 100$, or 400, Calories. $350 = 400 - 50$ √
There are 35 Calories in a peach and 100 Calories in a banana.

Solve each problem using the two given facts. If a chart is given, complete the chart to help you solve the problem.

1. Find the number of full 8 hour shifts that Cleo worked last month.
(1) He worked three times as many 8 hour shifts as 6 hour shifts.
(2) He worked a total of 180 hours.

	Hours per Shift ×	No. of Shifts =	Total hours worked
6 h shift	?	x	?
8 h shift	?	?	?

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3–6 *Problem Solving: Using Charts* *(continued)*

2. Find the total weight of the boxes of cheddar cheese in a shipment of 3 lb boxes of cheddar cheese and 2 lb boxes of Swiss cheese.
   (1) There were 20 fewer 2 lb boxes of Swiss cheese than 3 lb boxes of cheddar cheese.
   (2) The total weight of the shipment was 510 lb.

	Weight per box ×	Number of boxes =	Total weight
Cheddar	?	x	?
Swiss	?	?	?

3. Find the number of 20-ride tickets sold.
   (1) Twenty times as many 8-ride tickets as 20-ride tickets were sold.
   (2) The total number of tickets represented 3600 rides.

	Rides per ticket ×	Number of tickets sold =	Total rides
20-ride tickets	?	n	?
8-ride tickets	?	?	?

4. Find the amount of time Maurice spent taking bowling lessons.
   (1) He took three times as many 2 h bowling lessons as he did 1 h tennis lessons.
   (2) He spent a total of 28 h taking bowling lessons and tennis lessons.

	Hours per lesson ×	Number of lessons =	Total time
Bowling	?	?	?
Tennis	?	?	?

5. Find the number of Calories in a grapefruit and an orange.
   (1) An orange has 15 more Calories than a grapefruit.
   (2) Twenty oranges and ten grapefruit have 1800 Calories.

6. Find the number of Calories in a honeydew and in a cantaloupe.
   (1) A honeydew has 20 more Calories than a cantaloupe.
   (2) Six honeydew and three cantaloupes have 750 Calories.

Mixed Review Exercises

Solve.

1. $15x = 360$
2. $6 = \frac{3}{5}x$
3. $9z - 5z = 0$
4. $165 = 3x$
5. $6y + 5 = 35$
6. $-10 + 3y = -28$
7. $4x - x = 21$
8. $3(x + 2) = 4x$
9. $6x - 7 = 2x + 41$
10. $21 - x = 1 - 6x$
11. $-x = 3x - 52$
12. $5(y + 1) + 3 = 3y - 20$

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3–7 Cost, Income, and Value Problems

Objective: To solve problems involving cost, income, and value.

Formulas

Cost = number of items × price per item

Income = hours worked × wage per hour

Total value = number of items × value per item

Example 1 Tickets for a concert cost \$8 for adults and \$4 for students. A total of 920 tickets worth \$5760 were sold. How many adult tickets were sold?

Solution

Step 1 The problem asks for the number of adult tickets sold.

Step 2 Let x = the number of adult tickets sold.
Then $920 - x$ = the number of student tickets sold.
Make a chart.

	Number	× Price per ticket =	Cost
Adult	x	8	$8x$
Student	$920 - x$	4	$4(920 - x)$

Step 3 The only fact not recorded in the chart is that the total cost of the tickets was \$5760. Write an equation using this fact.

Adult ticket cost + Student ticket cost = 5760
$8x + 4(920 - x) = 5760$

Step 4

$$\begin{aligned} 8x + 4(920 - x) &= 5760 \\ 8x + 3680 - 4x &= 5760 \\ 4x + 3680 &= 5760 \\ 4x &= 2080 \\ x &= 520 \quad \leftarrow \text{adult tickets} \\ 920 - x &= 400 \quad \leftarrow \text{student tickets} \end{aligned}$$

Step 5 *Check:* 520 adult tickets at \$8 each cost \$4160.
400 student tickets at \$4 each cost \$1600.
The total number of tickets is 520 + 400, or 920. √
The total cost of the tickets is \$4160 + \$1600, or \$5760. √

520 adult tickets were sold.

Solve. Complete the chart first.

1. Forty students bought caps at the baseball game. Plain caps cost \$4 each and deluxe ones cost \$6 each. If the total bill was \$236, how many students bought the deluxe cap?

	Number ×	Price =	Cost
Deluxe	d	?	?
Plain	?	?	?

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3–7 Cost, Income, and Value Problems *(continued)*

Solve. Complete the chart first.

2. Adult tickets for the game cost \$6 each and student tickets cost \$3 each. A total of 1040 tickets worth \$5400 were sold. How many student tickets were sold?

	Number ×	Price =	Cost
Adult	?	?	?
Student	s	?	?

3. A collection of 60 dimes and nickels is worth \$4.80. How many dimes are there? (*Hint:* In your equation, use 480¢, instead of \$4.80.)

	Number ×	Value of coin =	Total value
Dimes	d	?	?
Nickels	?	?	?

4. A collection of 54 dimes and nickels is worth \$3.80. How many nickels are there? (*Hint:* In your equation, use 380¢ instead of \$3.80.)

	Number ×	Value of coin =	Total value
Dimes	?	?	?
Nickels	n	?	?

5. Henry paid \$.80 for each bag of peanuts. He sold all but 20 of them for \$1.50 and made a profit of \$54. How many bags did he buy? (*Hint:* Profit = selling price − buying price.)

	Number ×	Price (¢) =	Cost (¢)
Bought	b	?	?
Sold	?	?	?

6. Paula paid \$4 for each stadium cushion. She sold all but 12 of them for \$8 each and made a profit of \$400. How many cushions did she buy? (*Hint:* Profit = selling price − buying price.)

	Number ×	Price (¢) =	Cost (¢)
Bought	b	?	?
Sold	?	?	?

Solve. Make and complete a chart first.

7. I have three times as many dimes as quarters. If the coins are worth \$6.60, how many quarters are there?

8. I have 12 more nickels than quarters. If the coins are worth \$5.40, how many nickels are there?

Mixed Review Exercises

Simplify.

1. $\dfrac{30 \div 5 + 2}{13 - 5}$

2. $24 \div \dfrac{1}{4}$

3. $\dfrac{1}{4}(28y - 12) + 6$

4. $(-5)(4)(-2)$

5. $3(2x + 5) + 4(-x)$

6. $6(x - y) + 5(2y + x)$

Evaluate if $a = 2$, $b = 3$, and $c = 8$.

7. $\dfrac{3a + b}{c - 5}$

8. $\dfrac{bc}{2a}$

9. $2(c - a) - b \div 3$