Problem Solving
Quiz Chapter 7

Name Key

It's that time again, time for April to host a huge April Fool party. For last year's party she spent $60 on sodas and she bought 50 pounds of bananas. This year she plans to buy only half as many sodas. The price of soda this year is 20% more than it was last year. She also decided she needs three times as many bananas as last year, because the "pretend your banana is a phone and walk around the mall for 30 minutes" prank was so successful last year. Unfortunately the price of bananas is 75% more than the $.48 per-pound price she paid last year. She has $170 to spend on this year's party. Does she have enough money, or does she need to borrow money from her roommate?

10 points

5 points for breaking the problem into subproblems with questions written in words, 3 points for detailed numeric solution for each question, 2 points for final answer *circled*.

Last year
$60 on soda
50 lbs bananas
$0.48/lb

This year $170 to spend
Half the soda at 20% price ↑
Three times the bananas 150 lbs
at 75% price ↑

1. How much are bananas/lb this year? How much for 150 lbs?

($0.48)(0.75) = 0.36 0.48+0.36 = $0.84

(150)(0.84) = **$126 on bananas**

2. How much will the soda cost with the 20% price increase?

Half the cost of soda last year would have been $30
with a 20% increase... (30)(0.2) = 6
So half the **soda costs $36**

3. What is her total and how much is she short?

126 + 36 = $162

She will have **$8 in change - she will not need to borrow money.**

Problem Solving
Quiz Chapter 7

Name Key

Shelly has again decided to host her annual Halloween party. For last year's party she spent $90 on sodas and she bought 30 mini pumpkins. This year she plans to buy only half as many sodas. The price of soda this year is 10% less than it was last year. She also decided she needs twice as many mini pumpkins as last year, because the "bobbing for mini pumpkins" table was so successful last year. Unfortunately she has to buy her mini pumpkins from the grocery store this year (last year she bought them from the local farmer's market), and the grocery store charges 70% more than the $.50 per-pumpkin price she paid last year. She has $80 to spend on this year's party. Does she have enough money, or does she have to borrow money from her husband?

10 points

5 points for breaking the problem into subproblems with questions written in words, 3 points for detailed numeric solution for each question, 2 points for final answer *circled*.

Last year
$90 on soda
Soda
mini pumpkins 30

This Year
half as many sodas
price of soda 10% less
mini pumpkins 60
price of pumpkins 70% more than $0.50
$80 to spend

1. How much did she spend on pumpkins last year?
   $30 \cdot 0.5 = \$15.00$

2. How much will half as many sodas cost w/ 10% price reduction?
   $(1/2)(90) = \$45$ is half the soda cost
   $(0.1)(45) = \$4.50$ less
   $45 - 4.50 =$ **$40.50 on soda**

3. How much will 60 pumpkins be with 70% price increase?
   $(0.7)(0.5) = 0.35$ pumpkins now cost $0.85 each
   $(0.85)(60) =$ **$51 on pumpkins**

5. How much over her budget? $\$80 - \$51 - 40.50 =$ **Borrow (11.50)**

Problem Solving
Quiz Chapter 8

Name Key

A machine puts golf balls into boxes and then loads the boxes into cases. The machine is normally able to load 25 cases of golf balls per hour. There are 20 boxes in one case. There are 12 balls in one box. Today, the machine is running a little faster than usual so that it takes 0.2 seconds less time to load one golf ball into a box than it normally does. What is the machine's new rate in cases of golf balls per hour?

10 points

5 points for detailed solution (all steps to change units), 3 points for a summary of your approach, 2 points for final answer *please circle* (Machine's new rate in cases of golf balls per hour).

Facts - past performance

$\frac{25 \text{ cases}}{1 \text{ hr}}$ $\frac{1 \text{ hr}}{25 \text{ cases}}$

$\frac{20 \text{ boxes}}{1 \text{ case}}$ $\frac{1 \text{ case}}{20 \text{ boxes}}$

$\frac{12 \text{ balls}}{1 \text{ box}}$ $\frac{1 \text{ box}}{12 \text{ balls}}$

Facts - today's performance

Today it takes the machine 0.2 fewer seconds to load one golf ball into a box.

① convert cases/hr to seconds/ball

$$\frac{1 \text{ hr}}{25 \text{ cases}} \cdot \frac{60 \text{ min}}{1 \text{ hr}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} \cdot \frac{1 \text{ case}}{20 \text{ boxes}} \cdot \frac{1 \text{ box}}{12 \text{ balls}} = \frac{3600 \text{ sec}}{6000 \text{ ball}}$$

$$= 0.6 \text{ sec/ball}$$

② Subtract 0.2 seconds from ① to get the new rate in sec/ball $0.6 - 0.2 = 0.4 \text{ sec/ball}$

③ convert new rate 0.4 sec/ball to cases per hour

$$\frac{1 \text{ ball}}{0.4 \text{ sec}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} \cdot \frac{60 \text{ min}}{1 \text{ hr}} \cdot \frac{1 \text{ box}}{12 \text{ balls}} \cdot \frac{1 \text{ case}}{20 \text{ boxes}} = \frac{3600 \text{ cases}}{96 \text{ hour}}$$

$$= 37.5 \text{ cases/hr}$$

Problem Solving
Quiz Chapter 8

Name Key

A machine puts tennis balls into tennis ball cans. The machine is normally able to do 500 cases of tennis balls per hour. There are 24 cans in one case. There are 3 balls in one can. Today, the machine is running a little slower than usual so that it takes 0.1 seconds longer to load one tennis ball into a can than it normally does. What is the machine's new rate in cases of tennis balls per hour?

10 points

5 points for detailed solution (all steps to change units), 3 points for a summary of your approach, 2 points for final answer *please circle* (Machine's new rate in cases of tennis balls per hour).

Facts-past performance

$\frac{500 \text{ cases}}{1 \text{ hr}}$ $\frac{1 \text{ hr}}{500 \text{ cases}}$

$\frac{24 \text{ cans}}{1 \text{ case}}$ $\frac{1 \text{ case}}{24 \text{ cans}}$

$\frac{3 \text{ balls}}{1 \text{ can}}$ $\frac{1 \text{ can}}{3 \text{ balls}}$

Facts - today's performance

Today it takes the machine 0.1 more second to load one ball into a can.

① Convert cases/hr to seconds/ball

$\frac{1 \text{ hr}}{500 \text{ cases}} \cdot \frac{60 \text{ min}}{1 \text{ hr}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} \cdot \frac{1 \text{ case}}{24 \text{ cans}} \cdot \frac{1 \text{ can}}{3 \text{ balls}} = \frac{3600 \text{ sec}}{36000 \text{ balls}} = 0.1 \text{ sec/ball}$

② Add 0.1 sec to ① to get the new rate in sec/ball → 0.2 sec/ball

③ Convert new rate 0.2 sec/ball to cases per hour.

$\frac{1 \text{ ball}}{0.2 \text{ sec}} \cdot \frac{1 \text{ can}}{3 \text{ balls}} \cdot \frac{1 \text{ case}}{24 \text{ cans}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} \cdot \frac{60 \text{ min}}{1 \text{ hr}} = \frac{3600 \text{ cases}}{14.4 \text{ hr}}$

$= 250 \text{ cases/hr}$

Problem Solving
Chapter 8 Extra Credit

Name key

The maximum points allowed are limited to 2 above a perfect quiz score. For example, if you earned a 7 out of 10 on the chapter 8 quiz, you can earn no more than 5 points from this extra credit opportunity. All points will be applied to the chapter 8 quiz, but a score of over 100% will indirectly help raise a low score on another quiz. **Include units in all of your steps and show cancelations. No summary needed.**

Duane, Jeff, and Glen drove from their home in Racine, Wisconsin, to Chicago to see the Cubs play the Braves at Wrigley Field. The distance was 75 miles, and they averaged 20 miles per gallon. They drove an average speed of 50 miles per hour and spent $14.85 on gas. Find each of the following: (1 mile = 5280 feet; 1 meter = 3.281 feet)

$\frac{1 \text{ hour}}{50 \text{ miles}}$

$\frac{50 \text{ miles}}{1 \text{ hour}}$

a) List each piece of given information as two different, yet equivalent, ratios (1 pt)

$\frac{75 \text{ miles}}{1 \text{ trip}}$ $\frac{1 \text{ trip}}{75 \text{ miles}}$ $\frac{20 \text{ miles}}{1 \text{ gallon}}$ $\frac{1 \text{ gallon}}{20 \text{ miles}}$ $\frac{\$14.85}{1 \text{ trip}}$ $\frac{1 \text{ trip}}{\$14.85}$

b) Gallons (1 pt)

$\frac{1 \text{ gallon}}{20 \text{ miles}} \cdot \frac{75 \text{ miles}}{1 \text{ trip}} = 3.75 \text{ gallons}$

c) Hours (1 pt)

$\frac{1 \text{ hour}}{50 \text{ miles}} \cdot \frac{75 \text{ miles}}{1 \text{ trip}} = 1.5 \text{ hours}$

d) Dollars per gallon (1 pt)

$\frac{\$14.85}{1 \text{ trip}} \cdot \frac{1 \text{ trip}}{3.75 \text{ gallons}} = \$3.96 \text{ per gallon}$

e) Feet per second (1 pt)

$\frac{50 \text{ miles}}{1 \text{ hour}} \cdot \frac{5280 \text{ ft}}{1 \text{ mile}} \cdot \frac{1 \text{ hr}}{60 \text{ min}} \cdot \frac{1 \text{ min}}{60 \text{ sec}} = 73.33 \text{ ft/sec}$

f) Cents per minute (1 pt)

$\frac{\$14.85}{1.5 \text{ hours}} \cdot \frac{100 \text{ cents}}{1 \text{ dollar}} \cdot \frac{1 \text{ hour}}{60 \text{ min}} = 16.5 \text{ cents/min}$

g) Kilometers traveled (1 pt)

$\frac{75 \text{ miles}}{1 \text{ trip}} \cdot \frac{5280 \text{ ft}}{1 \text{ mile}} \cdot \frac{1 \text{ meter}}{3.281 \text{ ft}} \cdot \frac{1 \text{ Km}}{1000 \text{ m}} = 120.7 \text{ Km}$

h) Passenger-miles (1 pt)

$\frac{75 \text{ miles}}{1 \text{ trip}} \cdot \frac{3 \text{ passengers}}{1 \text{ trip}} = 225 \text{ passenger-miles}$

i) Passenger-miles per gallon (1 pt)

$\frac{225 \text{ passenger-miles}}{1 \text{ trip}} \cdot \frac{1 \text{ trip}}{3.75 \text{ gallons}} = 60 \text{ passenger-miles/gallon}$

j) Cents per passenger-mile (1 pt)

$\frac{\$14.85}{1 \text{ trip}} \cdot \frac{1 \text{ trip}}{225 \text{ passenger-miles}} \cdot \frac{100 \text{ cents}}{1 \text{ dollar}} = \frac{1485 \text{ cents}}{225 \text{ passenger-miles}}$

$= 6.6 \text{ cents/passenger-mile}$

Problem Solving
Chapter 8 Extra Credit

Name Key

The maximum points allowed are limited to 2 above a perfect quiz score. For example, if you earned a 7 out of 10 on the chapter 8 quiz, you can earn no more than 5 points from this extra credit opportunity. All points will be applied to the chapter 8 quiz, but a score of over 100% will indirectly help raise a low score on another quiz. **Include units in all of your steps and show cancelations. No summary needed.**

Duane, Jeff, and Glen drove from their home in Racine, Wisconsin, to Chicago to see the Cubs play the Braves at Wrigley Field. The distance was 90 miles, and they averaged 23 miles per gallon. They drove an average speed of 60 miles per hour and spent $15.85 on gas. Find each of the following: (1 mile = 5280 feet; 1 meter = 3.281 feet)

$\frac{60 \text{ miles}}{1 \text{ hour}}$ $\frac{1 \text{ hour}}{60 \text{ miles}}$

a) List each piece of given information as two different, yet equivalent, ratios (1 pt)

$\frac{90 \text{ miles}}{1 \text{ trip}}$ $\frac{1 \text{ trip}}{90 \text{ miles}}$ $\frac{23 \text{ miles}}{1 \text{ gallon}}$ $\frac{1 \text{ gallon}}{23 \text{ miles}}$ $\frac{\$15.85}{1 \text{ trip}}$ $\frac{1 \text{ trip}}{\$15.85}$

b) Gallons (1 pt) $\frac{1 \text{ gallon}}{23 \text{ miles}} \cdot \frac{90 \text{ miles}}{1 \text{ trip}} = 3.91 \text{ gallons}$

c) Hours (1 pt) $\frac{1 \text{ hr}}{60 \text{ miles}} \cdot \frac{90 \text{ miles}}{1 \text{ trip}} = 1.5 \text{ hours}$

d) Dollars per gallon (1 pt) $\frac{\$15.85}{1 \text{ trip}} \cdot \frac{1 \text{ trip}}{3.91 \text{ gallons}} = \$4.05 \text{ per gallon}$

e) Feet per second (1 pt)
$\frac{60 \text{ miles}}{1 \text{ hour}} \cdot \frac{5280 \text{ ft}}{1 \text{ mile}} \cdot \frac{1 \text{ hour}}{60 \text{ min}} \cdot \frac{1 \text{ hour}}{60 \text{ sec}} = 88 \text{ ft/sec}$

f) Cents per minute (1 pt)
$\frac{\$15.85}{1.5 \text{ hr}} \cdot \frac{1 \text{ hour}}{60 \text{ min}} \cdot \frac{100 \text{ cents}}{1 \text{ dollar}} = 17.61 \text{ cents/min}$

g) Kilometers traveled (1 pt)
$\frac{90 \text{ miles}}{1 \text{ trip}} \cdot \frac{5280 \text{ ft}}{1 \text{ mile}} \cdot \frac{1 \text{ meter}}{3.281 \text{ ft}} \cdot \frac{1 \text{ KM}}{1000 \text{ M}} = 144.83 \text{ KM}$

h) Passenger-miles (1 pt)
$\frac{3 \text{ passengers}}{1 \text{ trip}} \cdot \frac{90 \text{ miles}}{1 \text{ trip}} = 270 \text{ passenger-miles}$

i) Passenger-miles per gallon (1 pt)
$\frac{270 \text{ passenger-miles}}{3.91 \text{ gallons}} = 69 \text{ passenger-miles per gallon}$

j) Cents per passenger-mile (1 pt)
$\frac{\$15.85}{270 \text{ passenger-miles}} \cdot \frac{100 \text{ cents}}{1 \text{ dollar}} = 5.87 \text{ cents per passenger-mile}$

Problem Solving
Chapter 9 Quiz

Name Key

A sporting goods store bought a tent for a certain price and marked it up 85%. The tent didn't sell, so the store owner took 40% off the store's price and sold it at that price. What percent profit did the store make?

10 points

5 points for work and solution to an easier problem, 3 points for a summary of your approach (paragraph or outline format), 2 points for final answer *please circle* (the percent profit).

Extra Credit (1 pt): Write the final selling price of the tent in terms of the original purchase price before the mark up and mark down (use a variable to indicate this price).

set retail price = \$100

wholesale price $(0.85)(100) + 100 = \$185$

sale price $\$185 - (0.40)(185) = \$111$

profit $\$111 - 100 = \$11$ percent profit $\frac{11}{100} = 0.11$

11%

In terms of x:

Selling price $= (0.85x + x) - (0.4)(0.85x + x)$

$= 0.85x + x - 0.34x - 0.4x$

$= 0.11x + x$

$= 1.11x$

percent profit $= 0.11 \approx 11\%$

Problem Solving
Chapter 9 Quiz

Name Key

A sporting goods store bought a tent for a certain price and marked it up 75%. The tent didn't sell, so the store owner took 30% off the store's price and sold it at that price. What percent profit did the store make?

10 points

5 points for work and solution to an easier problem, 3 points for a summary of your approach (paragraph or outline format), 2 points for final answer *please circle* (the percent profit).

Extra Credit (1 pt): Write the final selling price of the tent in terms of the original purchase price before the mark up and mark down (use a variable to indicate this price).

set retail price = #100

wholesale price $(0.75)(100)+100 = \#175$

sale price $175-(0.3)(1.75) = 175-52.50 = 122.50$

profit $122.50-100 = 22.50$

percent profit $\frac{22.50}{100} = 0.225$ **22.5%**

In terms of x:

Selling price $= (0.75x+x)-(0.3)(0.75x+x)$

$= 0.75x+x-0.225x-0.3x$

$= 0.225x+x$

$= 1.225x$

percent profit $= 0.225 \approx 22.5\%$

Problem Solving
Quiz Chapter 11

Name Key

My sister Allyndreth has really bad luck. She started a baseball card collection last year, but unfortunately, she can't seem to keep track of all of her cards. Recently she had a particularly bad string of luck. She took all of her cards with her on the bus to school. On the way there, some bullying sixth graders stole 1/4 of her cards. Then she dropped six cards in the gutter when she got off the bus. She went to class and lost 2/3 of her remaining cards during show-and-tell. Then she gave three cards to her best friend. The teacher, Mr. Devlin, was really interested in baseball, so Allyndreth gave 3/5 of her remaining cards to him. When she went to recess, she found eight cards on the playground. Then at lunch, she accidentally threw half of her remaining cards away in her lunch bag. When she came home, she only had ten cards left. How many cards did Allyndreth have when she left for school?

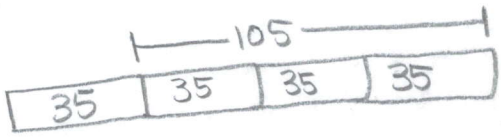
10 points

5 points for detailed solution (break the problem into steps of gaining, losing, and giving away baseball cards and include subtotals at each step), 3 points for a summary or outline of your approach, 2 points for final answer *please circle* (Number of cards Allyndreth started with).

140

1/4 of cards stolen

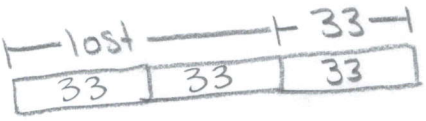
105



Dropped 6

99

Lost 2/3 of remaining

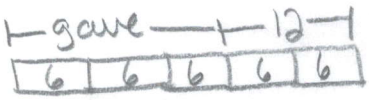


33

Gave 3 away

30

Gave 3/5 away



12

Found 8 cards

20

Threw away 1/2

10

Had 10 cards

She started with 140 cards.

Problem Solving
Quiz Chapter 11

Name Key

Triva went to the arcade at the state fair to win some goldfish. She already had some at home, but she wanted more. Right away, Triva won enough goldfish to double her stock. However, her mom made her give four to her cousin. She put her new ones in the fish tank with the others, but by the next morning, 1/2 of her goldfish had died. Triva's friend Keisha gave her six more. Unfortunately, the next morning 2/3 of her goldfish had died. Triva was left with two goldfish after having given one to a neighbor. How many goldfish did Triva start with?

10 points

5 points for detailed solution (break the problem into steps of gaining, losing, and giving away goldfish and include subtotals at each step), 3 points for a summary or outline of your approach, 2 points for final answer *please circle* (Number of goldfish Triva started with).

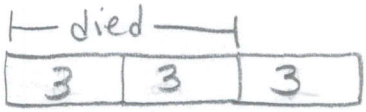
Doubled her stock of goldfish — 5

Gave 4 to cousin — 10

½ of all goldfish died — 6

Received 6 more — 3

2/3 of all goldfish died — 9



Gave 1 to neighbor — 3

Two left — 2

She started with 5 goldfish.

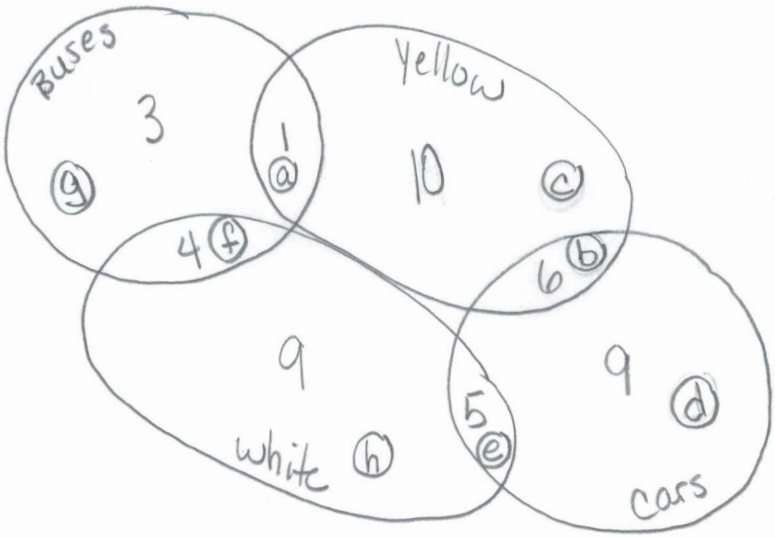
Problem Solving
Chapter 12 Quiz

Name Key

On the night our play-off was being held, a number of vehicles were in the east parking lot of the gym. Half of the white vehicles were neither cars nor buses. There were 8 buses in all, and only 1 of those was yellow. There were 16 other yellow vehicles, though, and 6 of those were cars. Of a total of 20 cars, 9 were not yellow or white. There were as many white buses as there were buses that were not white. Besides cars and buses, of course, there were vans and trucks. How many white vehicles were there?

10 points
4 points for detailed solution (draw the venn diagram), 4 points for an outline of your approach (list the clues in the order that you use them and show any mathematical calculations), 2 points for final answer *please circle* (How many white vehicles?).

vehicles in East Parking Lot



18 white vehicles

(a) of 8 buses, 1 was yellow
(b) 16 other yellow, 6 were cars
(c) 16 - 6 = 10
(d) 9 cars not yellow or white
(e) 20 - 9 - 6 = 5
(f) as many white buses as non-white so 4 white
(g) 4 non-white, 1 yellow so 3 not white or yellow
(h) half of the white vehicles were neither cars nor buses so with 4 white buses and 5 white cars, there are 9 white vehicles - trucks + vans

Problem Solving
Chapter 13 Quiz

Name Key

Mindy is mixing some sugary punch for tomorrow's fund-raiser. She took over for someone who goofed up. She knows that she already has 25 liters of an 18% punch mix and 45 liters of a 30% punch mix. How can she make both batches into a 25% mixture by mixing the existing punches and adding only water? How much water does she need to add once she mixes the two batches?

10 point
4 points for guess-and-check table (at least 3 guesses/checks), 4 points for algebra formula derived from the guess-and-check table (show your work to solve the equation), 2 points for final answer *please circle* (How much water does she need to add?).

amount of mix in 18% solution: $(0.18)(25) = 4.5$

Amount of mix in 30% solution: $(0.3)(45) = 13.5$

Amt mix	Amt 18% and 30% solutions	% of mix	x extra water	Total solution	% of mix
$4.5+13.5=18$	70	$18 \div 70 = 0.2571$	1	71	$18 \div 71 = 0.2535$
			2	72	$18 \div 72 = 0.25$

$$\%\ \text{solution} = \frac{\text{amt mix}}{\text{total amt of solution}}$$

Algebra $0.25 = \frac{18}{(70+x)}$

$0.25(70+x) = 18$

$70+x = \frac{18}{0.25}$

$x = \frac{18}{0.25} - 70$

$x = 2$ liters of water

Problem Solving
Chapter 13 Quiz

Name Key

Mindy is mixing some sugary punch for tomorrow's fund-raiser. She took over for someone who goofed up. She knows that she already has 20 liters of an 18% punch mix and 50 liters of a 30% punch mix. How can she make both batches into a 25% mixture by mixing the existing punches and adding only water? How much water does she need to add once she mixes the two batches?

10 point
4 points for guess-and-check table (at least 3 guesses/checks), 4 points for algebra formula derived from the guess-and-check table (show your work to solve the equation), 2 points for final answer *please circle* (How much water does she need to add?).

amt of mix in 18% solution
$(0.18)(20) = 3.6$

Amt of mix in 30% solution
$(0.3)(50) = 15$

Amt mix	Amt 18% and 30% solutions	% of mix	X extra water	total solution	% of mix
$3.6+15=18.6$	70	$18.6 \div 70 = 0.2657$	1	71	0.2620
			2	72	0.2583

$$\%\,\text{solution} = \frac{\text{amt mix}}{\text{total amt of solution}}$$

Algebra

$$0.25 = \frac{18.6}{(70+X)}$$

$$0.25(70+X) = 18.6$$

$$70 + X = \frac{18.6}{0.25}$$

$$X = \frac{18.6}{0.25} - 70$$

$X = 4.4$ liters of water