BOARD PROBLEMS Ch. 16

1) $FX = K + \frac{MX}{D}$ SOLVE FOR X.

2) IF THE TOTAL COST OF A MEAL IS $136.50 INCLUDING FOOD, TAX & TIP, WHAT WAS THE INDIVIDUAL COSTS OF TAX (10%), TIP (20%) AND FOOD?

3) FIND %O IN $K_2CR_2O_7$.

K = 39
O = 16
Cr = 52

4) FACTOR BY GROUPING.

a) $4v^3 - 12v^2 - 5v + 15$

b) $49x^3 - 35x^2 + 56x - 40$

SYSTEMATIC REVIEW

15D

Follow the directions.

1. Solve for H. $V = LWH$

$H = \frac{V}{LW}$

2. Solve for B. $A = \frac{AB}{2}$

$\frac{B}{2} = 1$

$B = 2$

3. Solve for L. $P = 2L + 2W$

$2L = P - 2W$

$L = \frac{P}{2} - W$

4. Solve for H. $V = \pi R^2 H$

$H = \frac{V}{\pi R^2}$

5. Solve for R. $A = 2\pi RH$

$\frac{A}{2\pi H} = R$

6. Solve for R. $I = \frac{E}{R+r}$

$(R+r)$ ~~$(R+r)$~~

$RI + rI = E$

Ask Mrs. Marcia

7. After deducting 15.3% for self-employment tax and 3% for state tax, I took home $968.40 for two weeks' work. What was my gross pay?

8. If I work 90-hour weeks (#7), what is my hourly rate of pay?

9. If I receive a 12% raise in my hourly rate (#8), what is my new take-home pay for two weeks?

10. What is the gross pay from which you figured the take-home pay in #9?

Lesson 16 Ratios

You know how to do ratios. Now we are going to derive equations from ratios in order to solve for missing information. In most of the problems in this lesson, the key will be to find all the possible ratios and then to choose the right one to find the correct answer. Let's do some problems to learn these two important concepts.

Example 1 There are 72 motor vehicles in the parking lot comprised entirely of motorcycles and cars. The ratio of cars to motorcycles is 3 to 1. How many cars are there? You can derive 3 ratios from this information. They are listed below. Only one was given, the cars to cycles, but we can also derive the cars to the total and the cycles to the total.

Cars to Cycles $\frac{\text{Cars}}{\text{Cycles}} = \frac{3}{1}$

Cars to Total Vehicles $\frac{\text{Cars}}{\text{Total}} = \frac{3}{4}$

Cycles to Total Vehicles $\frac{\text{Cycles}}{\text{Total}} = \frac{1}{4}$

Of the 3 ratios, which one uses the information given (total vehicles) and the information requested (number of cars)? The second ratio, cars to total vehicles, is the one to use.

$$\frac{\text{Cars}}{\text{Total}} = \frac{3}{4} \longrightarrow \frac{\text{Cars}}{72} = \frac{3}{4} \longrightarrow \text{Cars} = \frac{3 \cdot 72}{4} = 54$$

We can use this information to deduce that there are 18 cycles, since cars + cycles = 72.

You can also use what you know about atomic weights and ratios to find how many grams of each element are present in a given amount of that compound. Water has an atomic weight of 18 (2 hydrogens at 1 each and 1 oxygen at 16). There are three possible ratios to derive from this compound. Find out the mass of hydrogen if there are 1,440 grams of water.

Example 2

Hydrogen to Water $\frac{H_2}{H_2O} = \frac{2}{18}$

Oxygen to Water $\frac{O}{H_2O} = \frac{16}{18}$

Hydrogen to Oxygen $\frac{H_2}{O} = \frac{2}{16}$

Now if we know there are 1,440 grams of water, we can use our ratios to find the mass of the hydrogen present and the mass of the oxygen present. To find hydrogen's mass, choose the ratio which has water and hydrogen, since we have been given the amount of water, and we are looking for the amount of hydrogen.

$$\frac{H_2}{H_2O} = \frac{2}{18} \longrightarrow \frac{H_2}{1440} = \frac{2}{18} \longrightarrow H_2 = \frac{2 \cdot 1440}{18} \longrightarrow H_2 = 160 \text{ grams}$$

Example 3 Find the mass of carbon in CS_2. There are 1,596 grams of the compound.

Carbon to Compound $\frac{C}{CS_2} = \frac{12}{76}$

Carbon to Sulfur $\frac{C}{S_2} = \frac{12}{64}$

Sulfur to Compound $\frac{S_2}{CS_2} = \frac{64}{76}$

Of the 3 ratios, which one uses the information given (total grams of the compound) and the information requested (mass of the carbon)? The first ratio, carbon to compound, is the one to use.

$$\frac{C}{CS_2} = \frac{12}{76} \longrightarrow \frac{C}{1596} = \frac{12}{76} \longrightarrow C = \frac{12 \cdot 1596}{76} \longrightarrow C = 252 \text{ grams}$$

Sometimes there are 3 elements in a compound, which increases the number of ratios you can have. Choose the best one.

Ch. 16 RATIOS

Ex. 1 There are 72 vehicles, motorcycles and cars. The ratio of cars to motorcycles is 3:1. How many cars are there?

	PART	PART	WHOLE
RATIO			
ACTUAL			

Ex. 2 - If you have 1440 g of H20, How many grams of O and how many grams of H2 will you have?

Ex. 3 - Find the mass of Carbon in CS2 if the total is 1596g.

Practice Problems

1) The oak tree has 56 birds singing and sitting on its branches. A close look reveals only bluebirds and cardinals are present. The ratio of bluebirds to cardinals is 3 to 5. How many cardinals are there?

2) In Atlanta 42,000 fans came to the game. Braves' fans outnumbered Pirates' fans 2 to 1. How many intrepid Pirates' fans were at the game?

3) Find the mass of carbon in KCN. There are 455 grams of the compound.

4) Find the mass of nitrogen in KCN. There are 455 grams of the compound.

5) Find the mass of oxygen in MgO. There are 1,560 grams of the compound.

6) Find the mass of magnesium in MgO. There are 1,560 grams of the compound.

LESSON PRACTICE

16A

For each question, list all the possible equations, and then use the best one to find the answer.

1. The ratio of apples to oranges used in the salad was six to five. If 12 apples were used, how many oranges were needed?

Part: Part: Whole

	PART	PART	WHOLE
RATIO			
ACTUAL			

2. There are 30 days in the month of September. If the ratio of cloudy to sunny days was one to two, how many days were cloudy and how many were sunny?

	PART	PART	WHOLE
RATIO			
ACTUAL			

3. A total of 490,000 votes was cast. The ratio of votes received by Candidate A and by Candidate B was two to five. How many votes did candidate B receive?

	PART	PART	WHOLE
RATIO			
ACTUAL			

4. Squirrels outnumber rabbits by a ratio of eight to seven. If 56 rabbits are present, how many squirrels are there?

	PART	PART	WHOLE
RATIO			
ACTUAL			

5. Mrs. Smith's class has 24 students. The ratio of students who like reading best to those who like math best is three to five. How many like math best?

	PART	PART	WHOLE
RATIO			
ACTUAL			

LESSON PRACTICE 16A

For #6–10, use the atomic weight tables. Round to nearest hundredth.

6. There are 406 grams of NaCl. What is the mass of the sodium?

7. What is the mass of chlorine in 406 grams of NaCl?

8. There are 352 grams of H_2CO_2. What is the mass of the hydrogen?

9. What is the mass of carbon in 352 grams of H_2CO_2?

10. What is the mass of oxygen in 352 grams of H_2CO_2?

For #1–3: Davey's Restaurant did a survey and discovered that its customers preferred orange juice to cranberry juice by a four to three ratio. If 165 preferred cranberry juice, how many customers were interviewed?

1. List all the possible equations.

2. Tell which one will be used, and why.

3. Solve.

For #4–6: Potassium and oxygen are present in 752 grams of K_2O.

4. List all the possible equations.

5. What is the mass of the potassium?

6. What is the mass of the oxygen?

For #7–9: Carbon, hydrogen, and fluorine are present in 840 grams of CHF_3.

7. List some possible equations.

8. What is the mass of the carbon?

9. What is the mass of the fluorine?

10. Solve for H. $r = \frac{1}{3}\pi r^2 H$

11. Solve for N. $S = N \times \frac{A+L}{T}$

12. Mike Mussina's won/lost record is 13-5. What percentage of the games did he win?

13. What percentage of the games did he lose (#12)?

For #14–16, use the atomic weight table. Round answers to the nearest whole percent.

14. Find the percentage of carbon in CF_2Cl_2.

15. Find the percentage of fluorine in CF_2Cl_2.

16. Find the percentage of chlorine in CF_2Cl_2.

17. Tell the nature of the solution to $2X^2 + X = -1/2$ using the discriminant.

18. Solve to find the exact root(s) of #17. Factor when possible.

Solve for X. Complete the square if necessary.

19. $X^2 + 7/4\ X = 1/2$

20. Check the answers to #19 by placing them in the original equation.

For #12–13: Before the battle, 1,650 Marines established a beachhead. Only 932 Marines remained after the battle.

12. What percentage of the original company remained?

13. What percentage were killed or missing in action?

For #14–16, use the atomic weight table. Round answers to the nearest whole percent.

14. Find the percentage of carbon in H_2CO.

15. Find the percentage of hydrogen in H_2CO.

16. Find the percentage of oxygen in H_2CO.

17. Tell the nature of the solution to $X^2 + 16 = -8X$ using the discriminant

18. Solve to find the exact root(s) of #17. Factor when possible.

Solve for X.

19. $\frac{8X-3}{6} + 1 = \frac{X-5}{3} - \frac{2-3X}{8}$

20. $\frac{3X}{7} - X = \frac{5X}{3} - 2$