The Workshop Project Newsletter

PROGRESSIONS:
PEER-LED TEAM LEARNING

Volume 7, Issue 2

Winter 2006

Module 4: Linear Equations

Objective

- To solve linear equations based on workplace situations

Module 4A: Post-Lecture

These problems are based upon actual workplace situations. Each situation leads to different types of problems. By answering a series of questions, and solving each part of the problem, you will be following crucial steps that help you understand how to formulate mathematical expressions and linear equations. You must then use your knowledge of the properties of equality to solve the equations.

1. Although you are already a busy student in the process of completing your degree, suppose you also have a job working 40 hours each week. First write an equation relating the variables described in each of the following situations, then perform the indicated calculation based upon your 40 hours of work each week.

   a. Your weekly gross pay P for h hours if you are paid $10 an hour.

   b. Your weekly gross pay M when you receive an 8% bonus in your regular weekly salary P.

   c. Your weekly gross pay L when your regular weekly salary P is cut 8%.

   d. Your amount S saved/invested weekly when 92% of your weekly salary P covers your weekly bills and expenses.

   e. Your weekly gross pay G for h hours if you are paid $15 for the first hour and $10 for each additional hour.

2. Although many employees may feel a certain sense of job satisfaction and security where they work, company buyouts, mergers and cutbacks sometimes endanger that job satisfaction and security.

The total BuyRite salaries of 2 managers and 40 sales clerks is the same as the total ShopWell salaries of 4 managers and 26 sales clerks. When the two stores merge, one manager will be terminated so that more sales clerks can be hired.

a. Let m = salary of a manager and let c = salary of a sales clerk. Write an equation relating the variables.

b. How many sales clerks can be hired for the equivalent of one manager's salary?

c. If a manager receives an annual salary of $73500, how much does each sales clerk earn?

3. B. Well has worked for the Health Hub for 3 years. With regular raises, B. Well's net salary increases 10% each year. During the second year, B. Well earned a net salary of n dollars. Over the three-year period, B. Well earned a net total of $33100.

a. Write an expression to represent B. Well's net salary for the first year.

b. Write an expression to represent B. Well's net salary for the third year.

c. Write an equation, in terms of n, representing B. Well's total net salary for three years.

d. Calculate n, B. Well's net salary for the second year.

e. Calculate B. Well's net salaries for the first year and the third year.

f. At the end of the third year of employment at the Health Hub, B. Well received a notice that due to an overall decline in clientele, employee salaries are immediately frozen and raises will be suspended for a minimum of two years.

If the inflation rate remains at 6%, formulate an equation that indicates how much purchasing power B. Well will have in two years. Solve the equation.

4. Sometimes employees will file complaints because they feel that they are underpaid and/ or overworked. In order to validate a claim, it is often necessary to check the salaries and working conditions of other employees at the same organization.

   You are analyzing the following payroll information of a small group of very competent clerical workers in the same unit of a company:

Employee	Years of Service (y)	Hourly rate (h)
#1	5	$12.50
#2	3	$11.50
#3	7	$13.50
#4	2	$11.00
#5	10	$14.00
#6	12	$16.00

   a. Let h = hourly rate and let y = years of service. What is the formula for determining h?

   b. Which of the employees is most likely to file a complaint? Calculate the correct hourly rate for that employee.

5. It is not unusual for two workers in the same company to earn the same amount of money although one person works longer hours or more days.

   Last week, a full-time clerk in a real estate office earned $12 per hour with time and a half for more than 40 hours. The clerk's weekly salary was exactly the same as that of a part-time real estate salesman who earned a 2% commission on the sale of a property worth $33,000.

   a. Calculate the salesman's salary.

   b. Write an expression to represent the salary of the clerk.

   c. Write an equation indicating the relationship between the clerk's salary and the salesman's salary.

d. Calculate the number of regular hours and the number of overtime hours the clerk worked.

6. In this real estate office, part-time clerks C. Foreland and I. Ridgeworth earned the same salary, although one worked 5 days more than the other. C. Foreland earned $28 a day and I. Ridgeworth earned $48 a day.

   a. If I. Ridgeworth works d days, write an expression to represent the number of days that C. Foreland works.

   b. Write an expression to represent the salary earned by I. Ridgeworth.

   c. Write an expression to represent the salary earned by C. Foreland.

   d. Write an equation showing that C. Foreland and I. Ridgeworth earn the same amount.

   e. Calculate how many days each person worked.

7. Whether projects involve technological or human effort, or some combination of both, an on-going analysis of the work is part of keeping an enterprise running efficiently.

   Two computers working together can do a series of banking computations in 30 seconds. The faster computer working alone can do all the banking computations in 40 seconds.

   a. In 30 seconds, what part of the job can be done by the faster computer?

   b. In 30 seconds, what part of the job can be done by the slower computer?

   c. How long would it take the slower computer working alone to do all the computations?

8. Clerk #1 is assigned a job that she can complete in 8 hours. After she has been working 2 hours, Clerk #2, who is able to do this job in 10 hours, is assigned to help her.

   a. In 2 hours, what part of the job is done by Clerk #1? What part of the job is left?

   b. Write an expression to represent what part of the job Clerk #1 can do each hour of the total unknown time they work together.

c. Write an expression to represent what part of the job Clerk #2 can do each hour of the total unknown time they work together.

d. In how many hours will the two clerks working together complete the job?

Progressions: Peer-Led Team Learning
The Workshop Project Newsletter
Winter 2006, Volume 7, Issue 2

David Gosser, Consulting Editor, gosser@sci.ccny.cuny.edu
AE Dreyfuss, Editor, aedreyfuss@ccny.cuny.edu
Janet Liou-Mark, Co-Editor, Algebra Modules,
JLiou-Mark@CityTech.cuny.edu
June Gaston, Co-Editor, Algebra Modules, jlg1196@aol.com

The City College of New York
Marshak Science Building, MR-1024
160 Convent Avenue, New York NY 10031
Phone: 212-650-5704 Fax: 212-650-8339
Email: info@pltl.org Website: www.pltl.org

This newsletter is supported by a grant from the National Science Foundation's Division of Undergraduate Education. The views expressed herein do not necessarily represent those of the National Science Foundation.