Calculating Wages…How Much Will You Make?
(Systems of Equations — Solving Two-Step Equations)
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Pre-Algebra/Algebra I (Grades 8-10)

Time: 1 or 2 class periods (students can complete work as homework to reduce time required)

Objectives for Pre-Algebra:
Students will…
- Model, write, and solve two-step linear equations using a variety of methods.
- Compare and order rational numbers (positive and negative integers, fractions, decimals) in real-life situations.
- Use the basic operations on rational numbers to solve problems in real-life situations (e.g. describe the effect of multiplying a whole number by a fraction or a decimal less than 1).

Objectives for Algebra I:
Students will…
- Translate word phrases and sentences into expressions and equations and vice versa.
- Simplify polynomials by adding, subtracting, or multiplying.
- Distinguish between relations and functions.
- Evaluate a function using tables, equations, or graphs.
- Solve linear equations by graphing or using properties of equality.
- Match appropriate equations or inequalities (with 1 or 2 variables) to a graph, table, or situation and vice versa.

Materials List:
- Play money
- Scratch paper
- Pencil
- Calculator

Lesson Summary:
This is an introductory lesson to systems of equations, involving a two-step operation. The workplace is the arena for this synopsis, where students must uncover what their hourly wage will be at three different jobs (the daily wage for each job is $52.00), and which job would be more beneficial financially when overtime is involved. Students will be able to use the play money to deduct their reimbursed expenses from their daily wage and then divide the remaining money by the number of hours worked for the day.

Problem Situation for Students:
Each student is given their daily wage of $52.00 in play money and all necessary information about the three different jobs, including the three equations.

	Job #1	Job #2	Job #3
Hours Worked Daily	8	6	8
Reimbursed Expenses*	$12.00	$16.00	$20.00
Hourly Wage	x	x	x
Total Daily Wage	$52.00	$52.00	$52.00

*Reimbursed Expenses represent the daily allowance for expenses incurred — travel, gas, etc.

Student Questions:
1. What is a variable?
2. Which job or jobs are considered full-time employment?
3. What is the hourly wage (dollar amount per hour) earned for each job?
4. How do the reimbursed expenses affect the hourly wage amount?
5. Which job would be more financially beneficial with four hours of overtime involved, paid at the regular hourly wage amount?
6. Which job would be more financially beneficial with three hours of overtime involved, paid at time-and-a-half (1.5 or 1½)?
7. Which job would be more financially beneficial with two hours of overtime involved, paid at double-time?
8. How will overtime pay affect the daily wage in each scenario?

Sample Solutions:

<u>Reinforcement</u>

Coefficient	**=**	**Number of Hours Worked Daily**
Variable	**=**	**Hourly Wage**
Positive Integer	**=**	**Reimbursed Expense**
		Daily Wage

Hourly Wage:	Job #1	Job #2	Job #3
Step 1	8x + 12 = 52 -12 -12	6x + 16 = 52 -16 -16	8x + 20 = 52 -20 -20
Step 2	8x = 40 8 8	6x = 36 6 6	8x = 32 8 8
Answer	x = $5	x = $6	x = $4

Other Information:
In the extension section of this lesson, students will be required to write the equations for themselves and then solve.

Scaffolding Questions:
1. What would be the total wage of each job for one week, without overtime?
2. Write an equation for each job in question #1 to show a solution.
3. What would be the total wage of each job for one week, with 20 hours of overtime for the week, paid at time-and-a-half (1.5 or 1½)?
4. Write an equation for each job in question #3 to show a solution.

Extension Questions:
1. What would be the total wage of job #1, with 10 hours of overtime for one week, and overtime is paid the same as the regular hourly wage?
2. What would be the total wage of job #2, with 10 hours of overtime for one week, and overtime pay is time-and-a-half (1.5 or 1½) the regular hourly wage?
3. What would be the total wage of job #3, with 10 hours of overtime for one week, and overtime pay is double the regular hourly wage?