Automotive Worksheet - Time and Money

An automotive technician is often required to solve problems involving time and money as they relate to billing a customer and with regards to the technician's pay. Many mechanics are paid by the hour, but others work under a flat-rate system. A flat rate system uses time studies to determine how long it should take to do a job on average. If the mechanic takes longer than this average time, they still are paid the flat rate. If they finish the job in less time they still get the same flat rate. Flat-rate times are often given in hours and tenths of hours. Since there are 60 minutes in 1 hour, $\frac{1}{10}$th of an hour is $60\ \frac{\text{minutes}}{\cancel{\text{hour}}} \times \frac{1}{10}\cancel{\text{hour}} = 6$ minutes. Writing the equation this way makes it easy to convert from one unit of time to another. When one unit (like an "hour") is divided by the same unit, they cancel (that's what the slashes on top of the "hours" show). In this example, the "hour" in each term cancel out leaving only the minute units and the numbers. When converting from one time to another, try to set up an equation so that the units you want to convert cancel out, leaving only the units you want.

Example: How many hours are there in $3\frac{1}{2}$ days?

You should know that there are 24 hours in one day. First convert the mixed number into an improper fraction (this will make multiplying easier). $3\frac{1}{2} = \frac{7}{2}$. Then multiply by the conversion factor so that the units you don't want cancel:

$$\frac{7}{2}\cancel{\text{days}} \times 24\frac{\text{hours}}{\cancel{\text{day}}} = \frac{168}{2}\ \text{hours} = 84\ \text{hours}.$$

Example: How many seconds are there in 43.5 minutes? Hint: There are 60 seconds in one minute. That can be written as a conversion fraction: 60 seconds *per* minute is the same thing as $\frac{60\ \text{seconds}}{1\ \text{minute}}$. So,

$$43.5\ \cancel{\text{minutes}} \times \frac{60\ \text{seconds}}{1\ \cancel{\text{minute}}} = 2610\ \text{seconds}.$$

Example: At a dealership, the flat-rate time to do a valve job on a particular model is $2\ \frac{3}{10}$ hours and the pay is $80 for that work. A mechanic does 3 valve jobs in one 8-hour day. How much does he get paid for his efforts?

Since they are using a flat-rate pay system, the mechanic should get paid $80 for each valve job completed, for a total of 3 x $80 = $240.

What was the hourly pay for the mechanic for that days work?

The mechanic made $240 in 8 hours. So his hourly pay is $\frac{\$240}{8\ \text{hours}} = \frac{\$30}{\text{hour}}$.

The most frequently used equation by anyone who purchases or computes the cost of any purchase (auto parts, clothes, books, etc.) is this one: The total cost of an item equals the number purchased times the cost per unit.

Total cost = (amount purchased)x(cost per unit)

Example: You purchase 4 cases of oil at $12.95 per case. Each case contains 24 quarts. What is the cost per quart? What is the total cost? (Before taxes). Also find how much it costs per quart.

The total cost = (4 cases) $\text{x}\dfrac{\$12.95}{1\text{ case}} = \$51.80$

Since there are 24 quarts in a case, $\dfrac{\$12.95}{1\text{ case}} = \dfrac{\$12.95}{24\text{ quarts}} = \$.5396$ per quart. This number should be rounded up to the nearest cent: $.5396 = 53.96 cents = 54 cents = $.54 per quart. (Note that to convert from dollars to cents you multiply the dollars by 100.Divide by 100 if you want to convert from cents to dollars.)

Homework Problems

1. A mechanic works on the overhaul of a transmission. He starts at 8:25 AM and finishes at 4:23 PM, and takes one hour off for lunch. At $18.75 per hour, find out how much the mechanic earned to the nearest cent.

2. A classic car is completely repainted, taking 122 hours total to finish the job. Using an 8-hour workday, how many days and hours did it take to do the job?

3. A mechanic works in a shop that uses a flat rate pay system. The flat-rate time for replacing water pump is 2 and 6/10 hours and the flat rate pay is $60. He takes 2 and 1/10 hours to change the water pump on the first car, but 3 and 6/10 hours to change the water pump on a second car (the bolt broke!). He then takes 2 and 3/10 hours to replace the water pump on a third car. How much did he earn for his efforts? What was his hourly wage? If he had worked at exactly the flat rate time for these three water pump replacements, what would his hourly wage have been?

4. Looking at your timecards for the week, you see that you worked 7 hours 23 minutes on Monday, 7 hours and 14 minutes on Tuesday, 8 hours and 5 minutes on Wednesday, 9 hours and 31 minutes on Thursday, and 6 hours and 14 minutes on Friday. You are paid $15.50 per hour. How much is your pay for the week (before taxes)?

5. A garage owner buys 35,200 gallons of gasoline at $2.759 per gallon. If the gas is sold at $2.879 per gallon, what is his profit after all the gas is sold?

6. What is the total cost of these items: 4 large toolboxes, $39.99 each; 120 spark plugs at $1.55 each, 22 distributor caps at $12.44 each, 100 spark gap gauges at $.99 each?

7. A worker's paycheck for a 5-day workweek is $445.80. A workday is 8 hours. What is the worker's hourly pay?

8. A garage buys a 68-foot roll of heater 5/8 inch diameter heater hose for $12.00. If an average 6 ½ feet of hose are required for each car, how much does it cost the garage to put new hoses on a single car? How many cars can be fitted with hose from this roll? How much hose is left on the roll?

9. A car gets 20 miles per gallon and has a full gas tank with 16.5 gallons of gas when it leaves on a trip. If gas costs $2.85 per gallon, how much does it cost per mile to drive until the tank is empty? Hint: First find the total cost of a tank of gas and the total number of miles traveled on the trip.

10. A spray can of brake cleaner costs $1.89. If one can lasts for 11 brake jobs and a shop does 43 brake jobs a week, how much does it cost per week for brake cleaner? How many cans should the shop owner buy per week to ensure there is just enough brake cleaner?