

V is for Variable

Problem 1: Calculating the Tax

Jessica used the following formula to determine t , the sales tax on p , the dollar amount of a customer's total purchase at the t-shirt shop where Jessica works. A customer bought a red t-shirt for \$15 and 15 metallic letters for \$1.50 each. What is the sales tax on the customer's purchase?

$$t = 0.085p$$

The variable t :

1. What does the variable t represent in the equation?
2. Use a yellow highlighter to highlight where the variable t is defined in the problem above.
3. Are you given a value for the variable t ?
4. If yes, what is the value?
Highlight the value in the problem above.

The variable p :

1. What does the variable p represent in the equation?
2. Use a blue highlighter to highlight where the variable p is defined in the problem above.
3. Are you given a value for the variable p ?
4. If yes, what is the value?
Highlight the value in the problem above.

Write the meaning of the equation in your own words.

What is the sales tax on the customer's purchase?

Problem 2: Raking the Leaves

Carlos rakes leaves for his neighbors. He charges \$3.50 per hour to rake leaves plus \$4.00 to remove the bags of leaves. He used the equation below to calculate t , his total earnings based on h , the number of hours he works. How much will Carlos earn if he works for 4 hours and 45 minutes?

$$t = 4 + 3.50h$$

The variable t :

1. What does the variable t represent in the equation?
2. Use a yellow highlighter to highlight where the variable t is defined in the problem above.
3. Are you given a value for the variable t ?
4. If yes, what is the value?
Highlight the value in the problem above.

The variable h :

1. What does the variable h represent in the equation?
2. Use a blue highlighter to highlight where the variable h is defined in the problem above.
3. Are you given a value for the variable h ?
4. If yes, what is the value?
Highlight the value in the problem above.

Write the meaning of the equation in your own words.

How much will Carlos earn if he works for 4 hours and 45 minutes?

Who's Correct?

Samuel and Jeffery were asked to evaluate the following expression.

$$2x - 4, \text{ for } x = 12.6$$

Samuel and Jeffery each solved the expression but came up with different answers. Their work is shown below.

Samuel's Work	Jeffery's Work
$\begin{aligned} 2x - 4 \\ 2(12.6) - 4 \\ 25.2 - 4 \\ 21.2 \end{aligned}$	$\begin{aligned} 2x - 4 \\ 212.6 - 4 \\ 208.6 \end{aligned}$
Is Samuel correct? Justify your answer.	Is Jeffery correct? Justify your answer.

What is the value of $(5x - 2) + (6x + 4)$ for $x = -3$?

Four Square Equations

Use the provided information in the four sections of the board to complete any missing information. Then answer the questions that follow the board.

<p style="text-align: center;">Problem 1</p> <p>Hal's Plumbing charges \$_____ per half hour for labor in addition to a service fee of \$_____. Write an equation that could be used to determine c, the total cost for plumbing repairs by Hal's Plumbing for h hours.</p>	<p style="text-align: center;">Equation</p> <p>Define each variable: $c =$ _____ $h =$ _____</p> <p style="text-align: center;">$c = 25 + 15h$</p>																					
<p style="text-align: center;">Table</p> <p>Complete the table to determine c, the total cost for plumbing repairs by Hal's Plumbing for h hours.</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr style="background-color: #cccccc;"> <th style="padding: 5px;">Hours</th> <th style="padding: 5px;">Process</th> <th style="padding: 5px;">Total Cost (dollars)</th> </tr> </thead> <tbody> <tr><td style="padding: 5px;">0.5</td><td style="padding: 5px;"></td><td style="padding: 5px;"></td></tr> <tr><td style="padding: 5px;">1</td><td style="padding: 5px;"></td><td style="padding: 5px;"></td></tr> <tr><td style="padding: 5px;">1.5</td><td style="padding: 5px;"></td><td style="padding: 5px;"></td></tr> <tr><td style="padding: 5px;">2</td><td style="padding: 5px;"></td><td style="padding: 5px;"></td></tr> <tr><td style="padding: 5px;">2.5</td><td style="padding: 5px;"></td><td style="padding: 5px;"></td></tr> <tr><td style="padding: 5px;">h</td><td style="padding: 5px; border: none;">X</td><td style="padding: 5px;"></td></tr> </tbody> </table>	Hours	Process	Total Cost (dollars)	0.5			1			1.5			2			2.5			h	X		<p style="text-align: center;">Graph</p> <p>Complete the graph to represent c, the total cost for plumbing repairs by Hal's Plumbing for h hours. Label the graph.</p>
Hours	Process	Total Cost (dollars)																				
0.5																						
1																						
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2																						
2.5																						
h	X																					

- a. Use your equation to determine the total cost for a plumbing job that takes 4.5 hours to complete.
- b. How could you use your graph to determine the reasonableness of the cost for a 4.5 hours plumbing job?
- c. Use your equation to determine the number of hours if the final cost was \$90.
- d. Use your graph to determine the reasonableness of the number of hours it took for a plumbing job that cost \$90.

<p style="text-align: center;">Problem 2</p> <p>Ms. Jones' new van travels 345 miles on 15 gallons of gas. Write an equation that could be used to determine, m, the total number of miles Ms. Jones' van can travel on g gallons of gas.</p>	<p style="text-align: center;">Equation</p> <p>Define each variable:</p> <p>$m =$ _____</p> <p>$g =$ _____</p> <p>Write the equation:</p> <p style="text-align: center;">_____</p>																					
<p style="text-align: center;">Table</p> <p>Complete the table to determine m, the total number of miles Ms. Jones' van can travel on g gallons of gas.</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr style="background-color: #cccccc;"> <th style="padding: 5px;">Gas (gallons)</th> <th style="padding: 5px;">Process</th> <th style="padding: 5px;">Miles</th> </tr> </thead> <tbody> <tr><td style="text-align: center;">5</td><td></td><td></td></tr> <tr><td style="text-align: center;">10</td><td></td><td></td></tr> <tr><td style="text-align: center;">15</td><td></td><td></td></tr> <tr><td style="text-align: center;">20</td><td></td><td></td></tr> <tr><td style="text-align: center;">25</td><td></td><td></td></tr> <tr> <td style="text-align: center;">g</td> <td style="text-align: center;"></td> <td></td> </tr> </tbody> </table>	Gas (gallons)	Process	Miles	5			10			15			20			25			g			<p style="text-align: center;">Graph</p> <p>Complete the graph to represent m, the total number of miles Ms. Jones' van can travel on g gallons of gas.</p> <div style="text-align: center; margin-top: 20px;"> </div>
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10																						
15																						
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- a. Use your equation to determine how many miles Ms. Jones' van can travel on 40 gallons of gas.
- b. How could you use your graph to determine the reasonableness of the number of miles Ms. Jones' van can travel on 40 gallons of gas?
- c. Use your equation to determine how many gallons of gas Ms. Jones' van needs for a trip that is 701.5 miles.
- d. Use your graph to determine the reasonableness of the number of gallons of gas Ms. Jones' van would need for a 701.5 mile trip.

Four Square Equations Hint Cards*

Cut along the dotted lines. Two hint cards are provided.

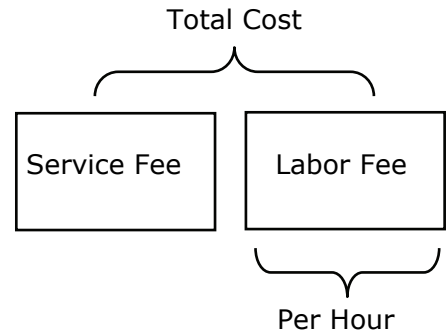
Hint Card

Problem 1

Where is the cost per hour seen in the equation?

How could you use the cost per hour to find the cost per half hour?

If the constant in the equation represents the service fee, how much is the service fee?



Problem 2

How many miles can Ms. Jones travel on 1 gallon of gas?

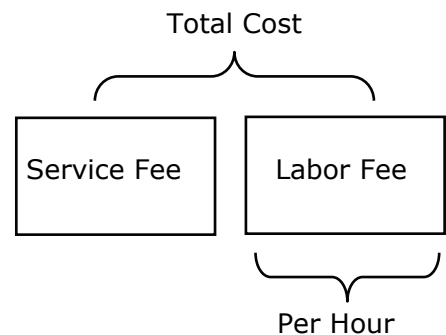
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Problem 1

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How could you use the cost per hour to find the cost per half hour?

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Problem 2

How many miles can Ms. Jones travel on 1 gallon of gas?

Solving Application Problems Organizer

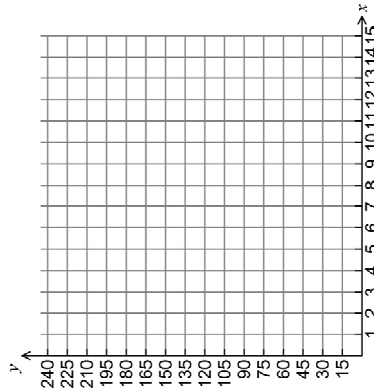
Cut along the dotted lines.

Sweet Bakery creates unique wedding cakes. The bakery charges \$15.00 per hour for labor in addition to a delivery fee of \$30. How much would a wedding cake that took 14 hours to create cost?

Solve the problem using an equation.

Sweet Bakery creates unique wedding cakes. The bakery charges \$15.00 per hour for labor in addition to a delivery fee of \$30. How much would a wedding cake that took 14 hours to create cost?

Solve the problem using a graph. Label the graph.



Sweet Bakery creates unique wedding cakes. The bakery charges \$15.00 per hour for labor in addition to a delivery fee of \$30. How much would a wedding cake that took 14 hours to create cost?

Solve the problem using a table.

Notes:

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Solving Application Problems Using:

Tables Graphs Equations

Female Elephants

The table below shows the relationship between the weight of a female elephant and the amount of vegetation she eats daily.

Daily Feeding

Weight Of Elephant (w)	Weight of Vegetation (v)
550	330
600	360
650	390
700	420

Determine if each statement is True (T) or False (F).

1. An elephant that weighs 625 pounds would eat 375 pounds of vegetation.
2. The equation is $w = 0.6v$.
3. An elephant that eats 700 pounds of vegetation daily would weigh about 1,200 pounds.
4. The equation is $v = 0.6w$.
5. Female elephants eat approximately 60% of their weight in vegetation daily.
6. If an 80-pound girl ate at this rate, she would eat 52 pounds of food daily.

Female Elephants*

Some female elephants can eat as much as 330 pounds of vegetation daily, which is approximately 60% of their weight. The table below shows the relationship between the weight of a female elephant and the amount of vegetation she eats daily.

Daily Feeding

Weight Of Elephant (w)	Process	Weight of Vegetation (v)
550		330
600		360
650		390
700		420
w		

1. Complete the process column of the table above.

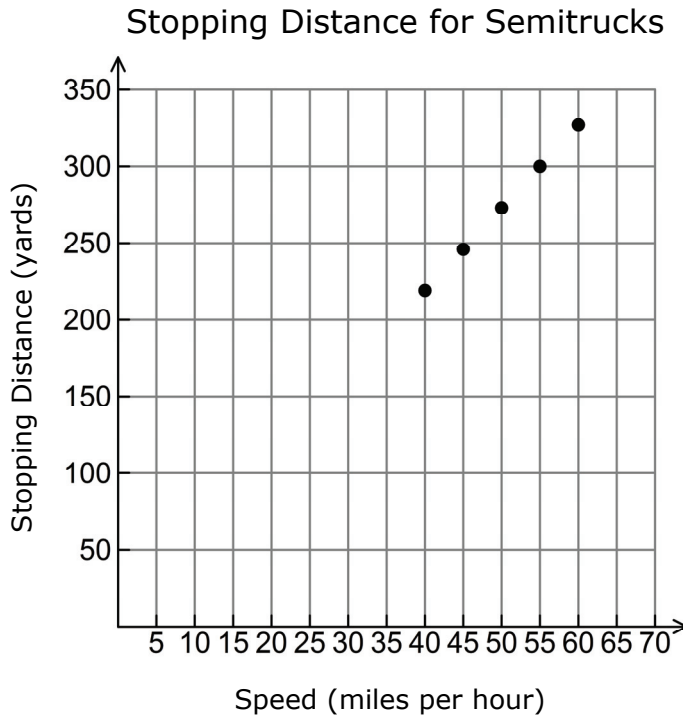
2. Write an equation that could be used to find v , the amount of vegetation of w , the weight of the female elephant.

3. Determine if each statement is True (T) or False (F).
 - An elephant that weighs 625 pounds would eat 375 pounds of vegetation.
 - The equation is $w = 0.6v$.
 - An elephant that eats 700 pounds of vegetation daily would weigh about 1,200 pounds.
 - The equation is $v = 0.6w$.
 - Female elephants eat approximately 60% of their weight in vegetation daily.

4. If an 86-pound girl ate at this rate, how much food would she eat in a day? Justify your answer.

Evaluate: Writing Equations

- The graph below shows the approximate stopping distance for a loaded semitruck, depending on the speed of the semitruck when the brakes were applied.



If the semitruck needed 296 yards to stop, approximately how fast was the semitruck traveling?

- A** Between 40 mph and 45 mph
- B** Between 45 mph and 50 mph
- C** Between 50 mph and 55 mph
- D** Between 55 mph and 60 mph

2. Jay knits scarves to sell at the craft fair. For each scarf she charges \$7.50 for yarn and \$4.00 for each hour spent knitting the scarf. Jay uses the equation below to calculate p , the price of the scarf based on t , the number of hours it took her to knit the scarf.

$$p = 7.5 + 4h$$

How much will Jay price a scarf that took her 6.5 hours to knit?

- A \$26.00
- B \$33.50
- C \$31.00
- D \$30.00

3. In central London, metro trains travel at an average speed of 20.5 miles per hour because of the short distance between stations. The equation below shows the relationship between d , the number of miles the train travels, and t , the number of hours traveled.

$$d = 20.5t$$

What is the distance in miles the train will travel in $1\frac{1}{2}$ hours?

Record your answer and fill in the bubbles. Be sure to use the correct place value.

				•		
0	0	0	0		0	0
1	1	1	1		1	1
2	2	2	2		2	2
3	3	3	3		3	3
4	4	4	4		4	4
5	5	5	5		5	5
6	6	6	6		6	6
7	7	7	7		7	7
8	8	8	8		8	8
9	9	9	9		9	9

4. The table shows the relationship between the age of a mature cat and its corresponding age in human years.

Comparison Chart

Age of a Mature Cat	Age of a Human
2	24
3	28
4	32
5	36
6	40

Based on the information in the table, what would be an approximate human age for a cat that is 13 years old?

- A** 33 years
- B** 44 years
- C** 68 years
- D** 76 years