Mat 011 Agenda  Day 5: 2/1/02

- Attendance
- Return Quiz
- PowerPoint Lecture 4, S13
- PowerPoint Lecture 5, S31

Distributive Property
Simplify Algebraic Expressions
Solving Equations
Rental Car Problem, S31

On Line Tutoring:
http://www.mc3.edu/peopplac/lal/lal.htm#ot

Homework: Topics 6, 7 pages S29, S43
\[-3 + 7 = 4\]
\[\frac{0}{0} : \text{ indeterminate}\]
\[3 - 7 = -4\]
\[-3 - 7 = -10\]
\[3 + ? = 10\]
\[(-3)(7) = -21\]
\[(-3)(-7) = 21\]
\[-40 + 70 = 30\]
\[30 - 90 = -60\]
\[-40 - 120 = -160\]
Mat 011 Web page:
http://www.mc3.edu/crsprog/career/MATHSCI/mat011/mat011.htm

BlackBoard: http://blackboard.mc3.edu
Your username is: << first letter first name – full last name – last 4 digits of Datatel ID >>
Password is: << Datatel ID >>
For Example:
Student Name: John Smith   Datatel ID: 1234567
ID: jsmith4567
Password: 1234567

[Signature]
Objectives

• To learn the procedure for solving equations

• To distinguish between $x + 2 = 8$ versus $2x = 8$

• To take a problem situation and solve the algebraic equation
A rental car company uses the formula
\[ C = 0.41M + 21.95 \]
to calculate the cost of renting a car driven \( M \) miles. If your vacation budget allows you to spend $100 for car rental, how far can you drive?

\[
\begin{align*}
C &= 0.41M + 21.95 \\
100 &= 0.41M + 21.95 \\
-21.95 &= -21.95 \\
78.05 &= 0.41M \\
M &= \frac{78.05}{0.41} \\
M &= 190.36 \text{ miles}
\end{align*}
\]
Solve the Equation: \( x - 5 = -2 \)

\[
\begin{align*}
x - 5 & = -2 \\
+5 & +5 \\
\hline
x & = 3
\end{align*}
\]
Solve the Equation: \( x - 5 = -2 \)

What operation is between \( x \) and 5?
Do the opposite!
Solve the Equation: \( x - 5 = -2 \)

What operation is between \( x \) and 5? Do the opposite!

\[
x - 5 + 5 = -2 + 5
\]

\[
x = 3
\]
Solve the Equation:  \(-3x = 15\)

\[
\begin{array}{c}
\frac{-3x}{3} = \frac{15}{3} \\
-1x = 5
\end{array}
\]
\[ x + 8 = -6 \]

\[ -8 \quad -8 \]

\[ \frac{-8}{x} = \frac{-14}{5} \]

\[ 5 \cdot x = -20 \]

\[ \frac{5}{5} \]

\[ x = -4 \]
Solve: \(2x - 8 = 5x + 4\)

\[
\begin{align*}
-5x & \quad -5x \\
\hline
-3x - 8 &= 4 \\
+8 & \\
\hline
-3x &= 12 \\
\hline
\frac{-3x}{-3} &= \frac{12}{-3} \\
\chi &= -4
\end{align*}
\]
\[2x - 8 = 5x + 4\]

\[\begin{align*}
-4 & \quad -4 \\
2x - 12 &= 5x \\
-2x & \quad -2x \\
-12 &= 3x \\
\frac{-12}{3} &= \frac{3x}{3} \\
-4 &= x
\end{align*}\]
\[2x - 8 = 5x + 4\]

\[
\begin{align*}
-2x & \quad -2x \\
\hline
-8 & \quad 3x + 4 \\
-4 & \quad -4 \\
\hline
-12 & \quad 3x \\
\hline
-4 & \quad x
\end{align*}
\]
Distinguish between
\[ x + 2 = 8 \] versus \[ 2x = 8 \]

\[
\begin{align*}
\underline{x} & \quad \underline{+2} & \quad \underline{-2} \\
\underline{x} & \quad \underline{= 6} & \quad \underline{x} & \quad \underline{= 4}
\end{align*}
\]
• \( x + 2 = 8 \)
• What operation joins 2 to \( x \)?
• Perform the opposite operation, subtraction
• \( x + 2 - 2 = 8 - 2 \)
• \( x = 6 \)
Distinguish between \( x + 2 = 8 \) versus \( 2x = 8 \)

<table>
<thead>
<tr>
<th>Equation</th>
<th>Operation</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>( x + 2 = 8 )</td>
<td>What operation joins 2 to x?</td>
<td>( x = 6 )</td>
</tr>
<tr>
<td></td>
<td>Perform the opposite operation, subtraction</td>
<td>( x + 2 - 2 = 8 - 2 )</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Equation</th>
<th>Operation</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>( 2x = 8 )</td>
<td>What operation joins 2 to x?</td>
<td>( x = 4 )</td>
</tr>
<tr>
<td></td>
<td>Perform the opposite operation, division</td>
<td>( 2x \div 2 = 8 \div 2 )</td>
</tr>
</tbody>
</table>
Solve: \( x + 8 = -3 \)

\[
\begin{align*}
X + 8 &= -3 \\
-8 - 8 &= \\
X &= -11
\end{align*}
\]
Solve: \( x - 2 = 5 \)

<table>
<thead>
<tr>
<th>( x - 2 = 5 )</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>( x + 2 )</td>
<td></td>
</tr>
<tr>
<td>( x = 7 )</td>
<td></td>
</tr>
</tbody>
</table>
Solve: \( 4x = -12 \)

<table>
<thead>
<tr>
<th>( 4x = -12 )</th>
<th>( \frac{-12}{4} = -3 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( x = -3 )</td>
<td></td>
</tr>
</tbody>
</table>
Solve: \( \frac{-2}{5} x = 4 \)

\[
\left(\frac{-2x}{5}\right) \cdot \frac{5}{1} = 4
\]

\[
-2x = 20
\]

\[
x = -10
\]
Solve: \( 4x - 7 = -27 \)

\[
\begin{align*}
4x - 7 &= -27 \\
+7 &+7 \\
\underline{4x} &= \underline{-20} \\
\frac{4x}{4} &= \frac{-20}{4} \\
x &= -5
\end{align*}
\]
Solve: \( \frac{1}{3}x + 4 = 6 \)

\[
\begin{align*}
\frac{1}{3}x + 4 &= 6 \\
\underline{-4} &\quad \underline{-4} \\
\frac{1}{3}x &= 2 \\
3 \left( \frac{1}{3}x \right) &= 2 \\
\end{align*}
\]

\[
\begin{align*}
\times \left( \frac{1}{3} \right) &= 3(2) \\
\frac{1}{3}x &= 6 \\
\frac{1}{3}x &= 6 \\
x &= 6
\end{align*}
\]
Solve: \( \frac{-4}{5} x = 12 \)

\[
\begin{align*}
\frac{-4}{5} x &= 12 \\
4x &= 60 \\
-x &= -15 \\
\therefore x &= 15
\end{align*}
\]
Solve: \( \frac{-4}{5} \times x = 12 \)
Solve: $5x - 11 = 4$
Solve: $4x - 7 = -27$
Solve: \( 8x - 2 = 11x + 7 \)

\[
\begin{align*}
-8y & \quad -8x \\
\underline{\phantom{-8y}} & \underline{\phantom{-8x}} \\
-2 & = 3x + 7 \\
-7 & \quad -7 \\
\underline{\phantom{-2}} & \underline{\phantom{7}} \\
-9 & = 3x \\
\frac{-9}{3} & \quad \frac{3x}{3} \\
-3 & = x
\end{align*}
\]
Solve: \( 2(4x+5) - 3x = 24 - 2x \)

\[
\begin{align*}
8x + 10 - 3x &= 24 - 2x \\
5x + 10 &= 24 - 2x \\
2x + 3x &= 24 - 10 \\
5x &= 14 \\
x &= \frac{14}{5} \\
\end{align*}
\]

\( x = \frac{14}{5} \)
Solve: $3x + 5 = 4 - 5x$
Solve: $3x - 8 = 4(5 - 3x) + 9$
Solve: $3(2x+8) = 6x-7$
Solve: $3(2x + 8) = 8x + 24 - 2x$
A company determines that cost, C, of making x items is \( C = 2.2x + 78 \) and the revenue, \( R \), is \( R = 2.25x \). Find the break even point.

\[
C = 2.2x + 78 \quad R = 2.25x
\]

\[
R = C
\]

\[
2.25x = 2.2x + 78
\]

\[
-0.05x = 78
\]

\[
x = \frac{78}{0.05} = 1560
\]
Wrecker charges $21.95 per day plus .41 a mile.

Complete the table.

<table>
<thead>
<tr>
<th>MILES</th>
<th>CALCULATION</th>
<th>COST ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>m</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Equation for Rental Car

A rental car company charges $21.95 per day plus 41 cents a mile.
Another rental company, Limo, charges a flat rate of $39.95 a day with unlimited miles. How many miles would you have to drive to make Limo cost the same as Wrecker?

\[
C_w = 0.41m + 21.95
\]
\[
C_L = 39.95
\]
\[
C_L = C_w
\]
\[
39.95 = 0.41m + 21.95
\]
Another rental company, Limo, charges a flat rate of $39.95 a day with unlimited miles. How many miles would you have to drive to make Limo cost the same as Wrecker?

<table>
<thead>
<tr>
<th>MILES</th>
<th>CALCULATION</th>
<th>Wrecker COST ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>(0.41 \times 10 + 21.95)</td>
<td>26.05</td>
</tr>
<tr>
<td>20</td>
<td>(0.41 \times 20 + 21.95)</td>
<td>30.15</td>
</tr>
<tr>
<td>30</td>
<td>(0.41 \times 30 + 21.95)</td>
<td>34.25</td>
</tr>
<tr>
<td>40</td>
<td>(0.41 \times 40 + 21.95)</td>
<td>38.35</td>
</tr>
<tr>
<td>44</td>
<td>(0.41 \times 44 + 21.95)</td>
<td>39.99</td>
</tr>
<tr>
<td>m</td>
<td>(0.41 \times m + 21.95)</td>
<td>C</td>
</tr>
</tbody>
</table>
Equation for Rental Car
A third company, Ertz, charges $18.95 a day and .50 a mile. What is the formula that calculates the cost of renting a car from Ertz for a day?
A third company, Ertz, charges $18.95 a day and .50 a mile. What is the formula that calculates the cost of renting a car from Ertz for a day? How many miles would you have to drive to make Ertz cost the same as Wrecker?
A third company, Ertz, charges $18.95 a day and .50 a mile. What is the formula that calculates the cost of renting a car from Ertz for a day? How many miles would you have to drive to make Ertz cost the same as Wrecker?

To solve this problem algebraically, set the cost of Ertz equal to the cost of Wrecker.