**Vocabulary:**

**Linear Expression** - an algebraic expression in which the variable is raised to the first power.

<table>
<thead>
<tr>
<th>Linear Expressions</th>
<th>Nonlinear Expressions</th>
</tr>
</thead>
<tbody>
<tr>
<td>5x</td>
<td>5x^2</td>
</tr>
<tr>
<td>3x + 2</td>
<td>3x^3 + 2</td>
</tr>
<tr>
<td>x – 7</td>
<td>x^4 – 7</td>
</tr>
</tbody>
</table>
1. \((2x + 3) + (x + 4)\)

Arrange like terms in columns.

\[
\begin{array}{c}
2x \\
x \\
+ 3 \\
+ 4 \\
\end{array}
\]

Add.

\[
\begin{array}{c}
2x + 3 \\
x + 4 \\
\end{array}
\]

\[
3x + 7
\]
2. \((2x - 1) + (x - 5)\)

Arrange like terms in columns.

\[
\begin{array}{c|c}
2x & -1 \\
\hline
x & -5 \\
\end{array}
\]

Add.

\[
\begin{array}{c|c}
2x & -1 \\
\hline
+ & x - 5 \\
\hline
3x & -6 \\
\end{array}
\]
a. \((3x - 5) + (2x - 3)\)

\[
\begin{array}{c}
3x - 5 \\
2x - 3 \\
\hline
5x - 8
\end{array}
\]

b. \((2x - 4) + (3x - 7)\)

\[
\begin{array}{c}
2x - 4 \\
3x - 7 \\
\hline
5x - 11
\end{array}
\]
3. Find $(2x - 3) + (-x + 4)$.

Arrange like terms in columns.

\[
\begin{array}{c}
2x & -3 \\
-x & +4 \\
\end{array}
\]

Add.

\[
\begin{array}{c}
2x & -3 \\
+ & -x & +4 \\
\hline
x & +1 \\
\end{array}
\]
4. Find $2(x + 3) + (3x + 1)$.

Use the Distributive Property.

$$2(x + 3) = (2 \cdot x + 2 \cdot 3)$$

$$= (2x + 6) + (3x + 1)$$

Arrange like terms in columns.

Add.

$$\begin{array}{c}
2x \\
+ 3x \\
\hline
5x \\
6 \\
+ 1 \\
\hline
7
\end{array}$$

$$5x + 7$$
5. Find $5(x - 4) + (2x - 7)$.

Use the Distributive Property.

$$5(x - 4) = (5 \cdot x - 5 \cdot 4)$$

$$= (5x - 20) + (2x - 7)$$

Arrange like terms in columns.

Add.

$$\begin{array}{c}
5x - 20 \\
+ 2x - 7 \\
\hline
7x - 27
\end{array}$$
c. \((x - 1) + (2x + 3)\)  
\[
\begin{array}{c}
\hline
x & - 1 \\
2x & + 3 \\
\hline
3x & + 2
\end{array}
\]

d. \((x - 4) + (-2x + 1)\)  
\[
\begin{array}{c}
\hline
x & - 4 \\
-2x & + 1 \\
\hline
-x & - 3
\end{array}
\]
e. $6(x + 7) + (x + 3)$

\[6(x + 7) = 6(x) + 6(7)\]
\[= 6x + 42\]

\[6x + 42\]
\[+ 1x + 3\]
\[= 7x + 45\]

f. $(12x + 19) + 2(x - 10)$

\[2(x - 10) = 2(x) - 2(10)\]
\[= 2x - 20\]

\[12x + 19\]
\[+ 2x - 20\]
\[= 14x - 1\]
6. Write a linear expression in simplest form to represent the perimeter of the triangle. Find the perimeter if the value of $x$ is 5 centimeters.

Write a linear expression for the perimeter of the triangle.

Write each expression.

$(3x - 3) + (2x + 9) + (5x)$

Rearrange to combine like terms.

$(3x + 2x + 5x) + (-3 + 9)$

Add.

$10x + 6$
6. Write a linear expression in simplest form to represent the perimeter of the triangle. Find the perimeter if the value of $x$ is 5 centimeters.

```
Find the perimeter.
```

Replace $x$ with 5. Simplify.

$10x + 6 = 10(5) + 6$

$= 56$

56 centimeters
g. A rectangle has side lengths \((x + 4)\) feet and \((2x - 2)\) feet. Write a linear expression in simplest form to represent the perimeter. Find the perimeter if the value of \(x\) is 7 feet.

\[ \text{a)} \quad 2(x + 4) + 2(2x - 2) \]
\[ \quad 2x + 8 + 4x - 4 \]
\[ \quad (2x + 4x) + (8 - 4) \]
\[ \quad 6x + 4 \]

\[ \text{b)} \quad 6x + 4 \]
\[ \quad 6(7) + 4 \]
\[ \quad 42 + 4 \]
\[ \quad 46 \text{ feet} \]
Got It? Do these problems to find out.

Write a linear expression in simplest form to represent the perimeter of the pentagon. Then find the perimeter if the value of $x$ is 3 yards.

**a)** $3x + 2x + 3x + 2x + (x + 4)$

$11x + 4$

**b)** $11x + 4 = 11(3) + 4 = 33 + 4 = 37 \text{ yd}$
Homework:

Pg. 399 - 402

#1-16 (all) and #25-33 (all)