

## Arithmetic Operations

A Mnemonic for the Order of Operations is “*Please Excuse My Dear Aunt Sally*”. Each of the following expressions contains ONE operation symbol. Regroup these expressions so that all expressions in the group have the same hierarchy. For example, group 1. [ ] brackets with 10. ( ) parenthesis in level 1. Write the number of the operation in the table below. C++ commands will be written following “//”. In order to use **pow** you must include **math.h**

- |                |              |                              |
|----------------|--------------|------------------------------|
| 1. [ ]         | 7. -3        | 13. $\sqrt{x}$               |
| 2. $3*2$       | 8. $x^{0.5}$ | 14. $2+3$                    |
| 3. $3\div 2$   | 9. $ab$      | 15. $3\cdot 5$               |
| 4. $2-3$       | 10. ( )      | 16. $x^2 // \text{pow}(x,2)$ |
| 5. $x^2$       | 11. $3 / 2$  | 17. $\frac{a}{b}$            |
| 6. $3\times 5$ | 12. { }      | 18. $15\backslash 3$         |
|                |              | 19. $15 \text{ MOD } 3$      |
|                |              | 20. $ x $                    |

Algebraic Hierarchy (Order of Operations)

Level									
<b>1</b>	1	10							
<b>2</b>									
<b>3</b>									
<b>4</b>									

**Count the number of operations in the following expressions. Write the count for EACH operation in the appropriate column. Write the TOTAL of all operations in the last column.**

Expression	^ pow(x,y)	*	- (opp)	/	MOD	- (sub)	+	Total
$\frac{(3x^2 + 2x + 1)^{10}}{(x^3 + 5)^5}$	4	2	0	1	0	0	3	10
$\frac{x^2 - 4}{3x^2 - 2x - 8}$								
$\left(\frac{2y^2 + 2y + 4}{6y - 3}\right)^{\frac{1}{3}}$								
$(x^3 - 3x + 3)^6 (x^2 + 2x + 5)^3$								

*In the following expressions, determine the order of the operations. For each operation, write its sequence number in the appropriate circle. In the second column, write the name of the operation by the matching number.*

<p>Example</p> $\frac{x^{\circ} - 1}{x^{\circ 2} - 3x + 2^{\circ}}$	<ol style="list-style-type: none"> <li>1.</li> <li>2.</li> <li>3.</li> <li>4.</li> <li>5.</li> <li>6.</li> </ol>
<p>Answer</p> $\frac{x^{\textcircled{1}} - 1}{x^{\textcircled{2} 2} - 3x + 2^{\textcircled{6}}}$	<ol style="list-style-type: none"> <li>1. Subtraction</li> <li>2. Exponentiation</li> <li>3. Multiplication</li> <li>4. Subtraction</li> <li>5. Addition</li> <li>6. Division</li> </ol>

$\left( \frac{5x + 1}{x^2 - 8} \right)^{\frac{3}{4}}$	<ol style="list-style-type: none"> <li>1.</li> <li>2.</li> <li>3.</li> <li>4.</li> <li>5.</li> <li>6.</li> <li>7.</li> </ol>
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$\left( \frac{5x^2 - x + 1}{x^2 - \frac{1}{2}x + 8} \right)^{\frac{1}{2}}$	<ol style="list-style-type: none"> <li>1.</li> <li>2.</li> <li>3.</li> <li>4.</li> <li>5.</li> <li>6.</li> <li>7.</li> <li>8.</li> <li>9.</li> <li>10.</li> <li>11.</li> <li>12.</li> </ol>
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$2 - x^2 / 3 + 4x$	<ol style="list-style-type: none"> <li>1.</li> <li>2.</li> <li>3.</li> <li>4.</li> <li>5.</li> </ol>
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$2 + x^2 / 3 - 4 / x$	<ol style="list-style-type: none"> <li>1.</li> <li>2.</li> <li>3.</li> <li>4.</li> <li>5.</li> </ol>
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**Convert each of the following arithmetic/algebraic expressions into an equivalent BASIC expression.**

1.  $3(2)+9\div 3+7-2$        $3 * 2 + 9 / 3 + 7 - 2$

2.  $3+14\div 7\cdot 5^2-7x+^{-}4$

3.  $7^2-3$

4.  $33\overline{)2607}$

5.  $2x^2+3x$

6.  $\frac{1}{2x+1}$

7.  $3x^2+3x+1$

8.  $3^{2^3}$

9.  $\left(\frac{3x+10}{x^3-7}\right)^{\frac{1}{2}}$

10.  $3\overline{)17}$  R=

**Using 1-10 above, evaluate each expression. Assume that  $x=2$  if necessary.**

- |    |     |
|----|-----|
| 1. | 6.  |
| 2. | 7.  |
| 3. | 8.  |
| 4. | 9.  |
| 5. | 10. |